BALLY MANUFACTURING CORPORATION, a Delaware corporation,

Plaintiff/Counterdefendant,

vs.

D. GOTTLIEB & CO., a corporation, WILLIAMS ELECTRONICS, INC., a corporation, and ROCKWELL INTERNATIONAL CORPORATION,

Defendants/Counterplaintiffs.

Docket No. 78 C 2246

Chicago, Illinois
March 16, 1984
11:30 a.m.

VOLUME XV-A
TRANSCRIPT OF PROCEEDINGS
BEFORE THE HONORABLE JOHN F. GRADY

TRANSCRIPT ORDERED BY: MR. JEROLD B. SCHNAYER
MR. MELVIN M. GOLDENBERG

APPEARANCES:

For the Plaintiff/
Counterdefendant:

MR. KATZ
MR. SCHNAYER
MR. TONE
MS. SIGEL

For the Defendants/
Counterplaintiffs:

MR. LYNCH
MR. HARDING
MR. GOLDENBERG
MR. RIFKIN
MR. ELLIOTT
MR. GOTTLIEB

Court Reporter:

LAURA M. BRENNAN
219 South Dearborn Street, Room 1918
Chicago, Illinois 60604

b2

THE CLERK: 78 C 2246, Bally v. Gottlieb, case on trial.

THE COURT: Good morning.

MR. TONE: Good morning, your Honor. May we talk about scheduling?

THE COURT: Yes.

MR. TONE: It looks as if, as nearly as we can tell, making guesses as to how long cross examination will take, as if we are going to finish our case sometime Monday, except for two witnesses, neither of whom is available on Monday.

One is a long witness, Professor Kayton. The other is a short witness, a Mr. Stern, who we are informed will not be available -- I think he's out of town until Tuesday afternoon.

The problem with Professor Kayton is that a meeting, a seminar, has been scheduled --

THE COURT: Well, here, let me interrupt.

That's no problem for me, if it's not for defense counsel, because I have lots of other things I can do.

MR. LYNCH: Well, I think the proposal is going to be that we go put on our case, and then Professor Kayton put on the direct case at the end of ours.

THE COURT: No. I will want to hear from you gentlemen extensively at the close of the plaintiff's case --

MR. TONE: That's why -- the reason is that a one-week seminar which Professor Kayton is responsible for and which has been the subject of mailings and so forth is scheduled to begin on Monday the 19th and to go all of next week until Friday. And then he tells us that he has classes on MOnday and Tuesday of the following week. That's the problem.

THE COURT: Well, he's been here so often, I assume that that meant he missed classes, if I'm correct as to who he is. If that's Professor Kayton out there --

PROFESSOR KAYTON: I'm Professor Kayton, your Honor. I have missed no classes.

THE COURT: Missed no classes.

T2

MR. TONE: All right.

THE COURT: -- on the motions I assume will be made at that time. And so I want to get the plaintiff's case, and then I want to hear from you as to where we are at that point.

MR. TONE: All right.

Your Honor I think said that would be no problem before because you had other -- we had made the assumption that we were going straight on through, and so we would have to do some juggling of witnesses. And that's why I raised the point.

Well, obviously also it's -- whatever we do, it's a point that ought to be discussed now.

THE COURT: Right. Well, we'll just take your witnesses when they're available.

Now, you say that they won't be available Tuesday.

MR. TONE: They will not -- Mr. Stern will not be available until Tuesday afternoon.

We are advised that Professor Kayton will not be available until a week from Wednesday.

THE COURT: You mean the 28th?

MR. TONE: Yes.

THE COURT: Why?

Now, that really does pose a problem. I mean, a week's delay is --

MR. LYNCH: That's it, your Honor.

MR. KATZ: He has not been here on Mondays and Tuesdays.

THE COURT: I see.

Well, I do not like to have a week's hiatus in the trial. That is something I had not bargained for.

MR. TONE: We did not, either. We are in that position.

MR. KATZ: Your Honor, we did bring this to the Court's attention about a month and a half ago.

THE COURT: Well, I am sure you did. I just do not remember.

MR. GOLDENBERG: I think there is another aspect to the matter, Judge.

Of course, what is Professor Kayton's testimony going to be about, and perhaps plaintiff could make a kind of proper summary at this point. The reason I raise that is whether or not it is testimony that is going to be helpful to you in deciding this case, and, in fact, it is our view that it would not.

In the first place, an issue that you have is, of course, the validity of the patent. We assume that Professor Kayton is going to be telling you about proceedings in the Patent Office and so forth, which are all in the record in the exhibits in the case.

Beyond that, we do not know what he could be saying.

The law and the statute and certainly enunciated by the CAFC is that there is a presumption of validity. As the CAFC has said, by evidence which is clear and convincing, we, of course, think we are going to do that.

So we have no legal dispute between us on the standards to which the Court must address itself. It would be our view that Professor Kayton or any other witness really is not going to add anything in proceedings at this time.

The two rules that address themselves to the matter in the first instance is Rule 402, which speaks of exclusion of evidence on grounds of prejudice, confusion, or waste of time, that the Court need not hear that kind of evidence.

THE COURT: Well, let me find out from Mr. Tone what the tenor of Professor Kayton's testimony is.

MR. TONE: Since Mr. Katz is the one who has prepared Professor Kayton, I am going to ask him to respond to your Honor.

MR. KATZ: Your Honor, when we originally undertook the reissue proceeding more than five years ago, the Court had requested the examiner's findings with respect to the various technological points involved in this case, which are very complicated.

Professor Kayton is prepared to testify in a

short, succinct manner with respect to each of the findings of the Patent Office. He has particularly a color-coded compendium index, one for the Court to use, to go in an abbreviated way, to go through the proceedings, to demonstrate exactly what the Patent Office position was on the technological points in this case in terms of obviousness over the prior art, anticipation, and that sort of thing, in a very expedited way. He has been for some time now preparing to do that.

THE COURT: How long do you think his direct examination will take?

MR. KATZ: Approximately a day and a half, and he is also going to speak to the question of the practice in the Patent Office on claim construction, the format of the claims that were used in this case, and also with respect to the subject of what the practice was on the computer programs in the Patent Office and what the effect -- how they were used in the Patent Office, and what the customs and practices and usages were during the time, which he is personally familiar with, during the time that this application was prosecuted and what significance that has in interpreting the patent document.

We are also going to have his testimony with respect to whether Dr. Schoeffler used the correct tests for construing claims in accordance with customs and practices.

THE COURT: Let me ask you this. When does Professor Kayton begin his period of unavailability?

MR. TONE: Monday, your Honor.

THE COURT: This coming Monday?

MR. TONE: Yes.

THE COURT: How much could we get done today, if we put him on right now?

MR. KATZ: I don't know that he's fully prepared to go on today.

THE COURT: Then, of course, we wouldn't get into cross examination, anyway.

MR. KATZ: And also, there were some -- a few witnesses that were going to be used as a predicate for his testimony. Mr. Stern and --

THE COURT: Why is he unavailable the 26th, 27th, and 28th?

MR. KATZ: Because the seminar goes for the entire week. The seminar is under his direction.

THE COURT: The entire week?

MR. KATZ: He's lecturing in two courses.

THE COURT: The seminar lasts two weeks?

MR. KATZ: No, one week.

MR. TONE: No, your Honor.

Your Honor, in answer to your Honor's question, the 26th and 27th are the days when he has classes.

MR. KATZ: I was talking about Monday and Tuesday.

MR. SCHNAYER: At the law school.

THE COURT: I see. Well, the week of April 2nd I'm going to be on vacation in Mexico. So, that week is out.

And the week of the 9th I commence criminal cases, and it's very unlikely I could do anything on this case in the month of April.

So, what we're talking about here is a month's delay in the completion of the plaintiff's case.

MR. GOLDENBERG: Your Honor, it seems to me that it's really only fair --

THE COURT: I'll tell you, frankly, I had anticipated on finishing this case before I left for Mexico. It never occurred to me that I would not back when I made those plans.

Now, I'll have to say that as time has gone on here, the prospect of our finishing the whole case in that time may not have been as clear as it was, but certainly finishing the plaintiff's case never presented any problem to me.

MR. TONE: Your Honor, would it be possible to rest subject to reopening to call Professor Kayton late the week of the 26th?

Now, that means that the defendants would have to go ahead with their case, and they've told me that they are reluctant to do that.

THE COURT: I don't want to go ahead with the defendants'

case until we've gotten over the motions at the close of the plaintiff's case. I don't want to spend any more time on this case than I need to.

I've got almost 600 other cases on my docket; and if this is a case which should be decided at the close of the plaintiff's case, I intend to do it. I don't intend to temporize about it, and I'll be frank with you. My mind is open on that point at this juncture, but that cuts two ways. It is open.

It seems to me there are very substantial questions presented on the plaintiff's own case. So, I'm not going to embark on the defense case here because that, of course, would involve a rebuttal case.

MR. TONE: I had an idea that I would like to discuss with my colleagues for a minute or two. May we be excused to do that?

THE COURT: All right. We'll take a short recess.

MR. TONE: Thank you.

4-1b1

(Brief recess.)

MR. TONE: your Honor, Professor Kayton says that it would be possible for him to cancel his classes on Monday and Tuesday, so he could be prepared to take the stand on Monday, the 26th. That would mean we would -- my optimistic estimate was that we would finish our case on Monday the 19th -- that's always, I suppose, subject to some slippage.

But there would then be a gap of, let us say, three or four days before Professor Kayton went on the stand.

Would that be possible for your Honor?

THE COURT: Yes. We can work that out.

The 26th would be the first day he could make it?

MR. TONE: Yes. And meanwhile we would finish our case and call Mr. -- our last witness, Mr. Stern, and then ask for a recess until Professor Kayton could be available.

THE COURT: All right. Looks like that's the best we can do.

And I appreciate Professor Kayton rearranging his schedule.

So let's set it for 9:00 o'clock on the 26th. And we'll cancel the oral arguments that I had set for the 26th.

MR. TONE: Thank you, your Honor.

THE COURT: All right.

MR. SCHNAYER: For the record, I have marked the chart which Dr. Schoeffler testified about and helped draw, which shows the comparison of the scope of claims 1 and 2 and 1 and 3, PX-474.

JAMES SCHEFFLER, PLAINTIFF'S WITNESS, PREVIOUSLY SWORN

REDIRECT EXAMINATION (Resumed)

BY MR. SCHNAYER:

Q Dr. Schoeffler, on the cross examination by Mr. Lynch and Mr. Goldenberg you referred to what Claim 45 covered, did you not?

A Yes, sir.

Q Are you aware of any microprocessor-controlled pinball game that is not covered by Claim 45?

A Yes, sir. The Atarian pinball game is not covered by Claim 45, and I testified that way.

Q So it's possible to build a pinball machine, microprocessor controlled, which is not covered by Claim 45?

A That is correct, sir.

THE COURT: Tell me again why 45 doesn't cover the Atarian?

THE WITNESS: The Atarian did not matrix multiplex the switches, sir.

THE COURT: Thank you.

BY MR. SCHNAYER:

Q And that's the same for the other representative claims,

too, isn't it?

A That is correct, sir.

Q Do you recall testifying on cross examination that one of the requirements of the patent claim 45 is matrix multiplexing of both switches and some displays?

A That is correct, sir.

Q Would a game which only matrix multiplexes the switches infringe Claim 45?

A It would not, sir.

Q And what about the other representative claims?

A That is correct, sir, it would not.

Q To your knowledge is there any reason why the defendants couldn't use the same sort of system as in the Atarian rather than the system that they are charged with infringing the patent in suit?

A I know of no reason, sir.

Q Dr. Schoeffler, on cross examination by Mr. Lynch he asked you a series of questions about the operator switches which are shown on the left-hand portion of PX-53, and I believe it's this chart here. That's the mux chart.

In your opinion were the operator-adjustable switches implemented in the Flicker game, PX-333?

A No, sir, they were not. An examination of the computer program that was dumped from the PROM memories in the Flicker game indicates that they were not implemented and not

intended to operate, and in fact that area of the -- in that program that was dumped indicates that that area was used for other things.

And so it is rather clear that those switches in fact should not be plugged in on the back of that game.

As a consequence, the entire discussion of sneak paths that go through those switches becomes irrelevant, if they're not supposed to be used.

T5

MR. SCHNAYER: That concludes my redirect examination.

I have some exhibits that I would like to offer, Plaintiff's Exhibits 28-A, 466, 467-A and -B, 469, and 474.

THE COURT: All right, those are all received.

(Plaintiff Exhibits 28-A, 466, 467-A, and 467-B, 469, and 474 were received into evidence.)

MR. LYNCH: May it please the Court?

THE COURT: Mr. Lynch.

RECROSS EXAMINATION

BY MR. LYNCH:

Q. Professor Schoeffler, you discussed the various changes that occurred in the Flicker game, did you not?

A. I did, sir.

Q. I believe your testimony was they were inconsequential?

A. That is what I testified, sir.

Q. Now, in some of these changes, let's just compare briefly Figure 5 of the patent with the changes.

In Figure 5 of the patent, there is shown the switches going to a register, 60, 60 or 68. I believe it is 60.

A. That is correct, sir.

Q. Now, the switches in Exhibit 28 as modified in the Flicker game go through a 14016, correct?

A. That is correct, sir.

Q. Is that 14016 a register?

A. That is what is called a multiplexer chip. It is not a register. It is called a multiplexer chip, which connects it in, so that the signals can be brought directly into the memory of the computer.

Q. It is a transmission gate, isn't it?

A. That is right.

Q. In fact, when that chip is enabled, all it does is act like a bunch of wires, so that these bus lines will see precisely what is happening on those wires, correct?

A. That is correct, sir.

Q. Now, the chip that it replaced, the 14502, was that a register?

A. I do not recall, sir.

Q. The other change that was made had to do with the change from 14050 to 14049, correct?

A. That is correct.

Q. When one changes that, would one have to change the software?

A. Yes, sir. I testified that the instruction that reads the test line has to read it low instead of high or vice-versa because of that in the upper right-hand corner, that one change.

Q. How about all of the changes? Does that require even further changes to the software?

A. Not that I am aware of, sir.

Q. Now, did you inspect the Flicker game?

A. I inspected -- I looked at the board and looked at the chips. I did not trace the circuits on the CPU board is what I testified and what I did --

Q. Two of the chips --

A. -- and what I did not.

Q. Excuse me, Professor.

Two of the chips, in fact, the 14049s were chips that bore date codes 7444, correct?

A. I did not actually inspect the date codes in any of the chips, sir.

Q Well, in a statement to the Court prepared by Bally, they indicated --

MR. TONE: Mr. Lynch, there is no question that that is a fact, as we understand it, if that would help.

MR. LYNCH: I just wanted --

BY MR. LYNCH:

A -- that the MC14049s bore a date code of 7444.

What does that mean to you?

A It is my understanding they were manufactured in the 44th week of 1974, sir.

Q That would be approximately the first week in November, right?

A That is approximately correct.

Q These two chips, the 14049s then which have been manufactured the first week of November 1974?

A That is my understanding of those date codes, sir.

Q What is your understanding of how quickly one in the normal course of business would get a chip from Motorola?

A In 1974 I have no experience. So I have no way even to estimate the time, sir.

Q A couple of weeks?

A I have no way to estimate whether it is a week or a year.

Q So suffice it to say, if, indeed, two or those 14049 chips bore date codes of 7444, that would indicate or at least could indicate that the change that was made from 14050s to 14049s was made late in 1974, after November,

would it not?

A I do not see that it indicates that. It merely indicates that those chips were plugged into the board, presumably at that late date. There may well have been 14049s from the very first date the board was wired. I have no way of knowing that, sir.

Q But you do recall and you based early testimony on Jeffrey Frederiksen's testimony that Exhibit 28 was the condition of the Flicker game in September of 1974, isn't that correct?

A I do not recall his precise testimony. I recall him testifying about the schematics.

I would have to go back and re-read it, if you need a precise wording of that recollection.

Q There are several other inconsistencies between 28 and some other of the diagrams, Doctor.

In particular, how many triac drives are shown on 28?

A This shows 11 wires coming out of the chip labeled 14514 with pin numbers associated with it that are illegible on this blow-up.

Q And on the -- I count 11, also, Doctor.

A Okay.

Q On Exhibit 52 there appear only 10 triac drives; isn't that correct?

A That is correct, sir. At plug 2 there are 10 indicated. That is correct, sir.

Q So, that could also indicate another change in configuration of the the machine to some extent?

A Well, it indicates another ambiguity or difference. Whether it is a change or a drawing error is impossible to say.

Q Up here it indicates that there's a 15-volt regulated output coming from the board.

A There is a line that says 15 volts out from the regulator, yes, sir.

Q Did you find that in the Flicker or in any of the other drawings?

A I traced no wires, sir. I was not looking for anything like that.

Q Let me get to the next matter then.

Do you have a copy of Exhibit 469, Doctor?

A That's my summary chart?

Q Yes.

A Yes, sir, I do.

Q I understand that for the most part it may be self-explanatory, but I do have some questions about it.

In the column Combination, et cetera --

A Yes, sir.

Q -- you have as one of the factors for infringement of the Williams Disco Fever, the Williams Flash, the Williams Black Knight, and the Gottlieb Spiderman the term "interlock." However, that term doesn't exist in the list of the Cleopatra game.

Now, what precisely are you referring to as the interlock feature existent in those four games and not existent in the Cleopatra game?

A The word interlock I use as synonymous with the offset in time for reading the switches, and in my direct testimony, I indicated that I was unable to determine whether there was an offset in time for the reading of the switches in the Gottlieb Cleopatra game and, as a consequence, was not able to read Claim 46 on it. That is what that refers to, sir.

Q Now, the interlock in time during reading of the switches meant that during that time period, as I got your

testimony, there were no lamps being lit and no solenoids being turned off; is that correct?

A In general it is not quite correct, sir.

The term means to offset the time of reading the switch from the time of generation of noise.

In the case of Flicker, it was the turning off of solenoids, and it was displaced in time from the turning on the digits and the lamps; and I looked for that offset in time in a low-noise environment as part of the hardware/software noise combination in each game. I was unable to find that in Cleopatra, sir.

Q I understand that.

And then in each of the games, you have right under interlock -- for example, in Disco Fever you have no scan during solenoid closure.

Is that separate from interlock?

A Yes, sir. That is simply an example of the use of software in conjunction with hardware, and that refers to those pop-up switches that were used in that game, where at the time you decide to activate the solenoid, which is a high noise time, you pop up the solenoid so that the switches come up, but you also know that you do not want to read those switches on the way up and process them, and so you deliberately suppress the scanning during that interval.

That was -- that is what I meant by those words in my summary, sir.

Q Forgive me, Doctor. Isn't that the same as interlock?

A No, sir. Interlocking means offset in time when you are going to read the switches. This is deliberately not reading the switches at all.

In other words, you're not picking a time to read them. You must not read them because the programs presumably would then process them, and they should not be.

So, it is a specific software noise immunity thing that was introduced in those games and testified in the various -- about in the various depositions.

Q Doctor, could you show me on the board to what you're referring as this no closure during solenoid on the Cleopatra and the Disco Fever?

A I don't know whether I can or not. All of my understanding of that process I learned from the depositions about the games.

I might be able to find the switches there, but I haven't looked for them; and the program, of course, would not be apparent.

Q Well, if you wouldn't mind, Doctor -- may it please the Court -- now let's get to the Disco Fever and the Cleopatra.

(Brief interruption.)

BY MR. LYNCH:

Q If we were to take Cleopatra, it is the case that there are solenoids behind the slingshots, correct?

A That is correct, sir.

Q And solenoids on these pot bumpers, correct?

A That is correct, sir.

Q And those solenoids -- and solenoids on slingshots up here, correct?

A That is correct, sir.

Q Now, those solenoids propel the ball. When the ball hits it, they come off with a force in the game action, right?

A That is correct, sir.

Q Now, these solenoids on Cleopatra, just to take an example, the pot bumper solenoids and the various slingshot solenoids, these are activated without regard for the scanning cycle of the machine, correct?

A That is correct, sir.

Q So whatever noise these generate, the machine has to live with, correct?

A That is correct, sir.

But of course that also means that the microprocessor is not directly connected with those machines, so there's

a difference in the noise environment as far as the microprocessor is concerned.

Q. Well, the microprocessor is sensing a switch here --

A. Yes, sir.

Q. -- and right next to it is a solenoid here.

A. Yes, sir.

Q. And this solenoid can be activated and be making noise while the ball is going over that switch.

A. That is correct, sir.

Q. And in the Flicker game you testified that there's a purposeful software arrangement that is set forth so that that can't happen.

A. I did, sir.

Recall in the Flicker game that those are AC solenoids, whereas in this game these are DC solenoids; and as you asked me and I responded, there's a lower noise situation here.

But the offset in time is not associated -- that is, the non-scanning during the pop-ups is not what I meant in my summary to refer to these solenoids.

Q. Which solenoids are you referring to on Cleopatra?

A. I'm referring to the solenoids that in the depositions were referred to as pop-up switches that are associated with the pop-up targets.

Q. There are pop-up targets right along here?

A. That -- I believe that is what the depositions concerning the various machines were discussing, and that's what I was referring to in my summary.

Q. Do you know how -- may I finish, sir, please.

And the non-scanning during the pop-up is not the noise in the solenoid sense of the noise.

It is the fact that the kinds of switches that are on here are activated when it goes down or up. And you're supposed to only record score, is my understanding, when they go down.

So during the time the switches are coming up, you want to ignore them.

It has nothing to do with solenoid noise or things of that nature. That's all that indicates, sir.

Q. So what you're saying is that the software of Flicker doesn't record any score when these pop-up targets return.

A. No, sir. Flicker does not have any pop-up targets. It's these games that -- it is my understanding that you record the score when you hit the switch, and then when you reset them you do not want to read the switches.

Q. Well, if Flicker didn't have this as an occurrence, how does this become a feature of the '441 patent that convinces you that these machines infringe?

A. Not reading the switches at the wrong time is analogous to a debounce routine. That is, there are times when you do

not want to read this.

And when I testified that among all the requirements, for example, in Claim 45 is this combination of hardware and software working together to yield the noise prevention and noise immunity, and so this is a kind of debounce routine.

It is not the same as in Flicker, because Flicker didn't have this and didn't need it.

But it is a good example, in fact, of hardware and software cooperating because that's the nature of this game.

Every game is different and can be different in the future.

Q Did you play this game, Doctor?

A Cleopatra, I believe I did play it.

Q Do you know how it works?

A I just played it to see the response. I don't really know the game rules in detail.

Q Do you know when it is typical that these targets are restored to their upright condition?

A No, sir. In the depositions it was not discussed.

But the procedure I talked about was discussed at length in the depositions.

Q So it will be clear to the Court, on Disco Fever we have a number of slingshots and pot bumpers, correct?

A That is correct, sir.

Q And those slingshots and pot bumpers likewise do not -- are not controlled by the CPU, correct?

A They are not actuated by the CPU when the ball hits the slingshot or the pot bumper, that is correct, sir.

Q So these solenoids on Disco Fever, the playfield solenoids that contribute action to the game, do not -- do not have their actuation regulated so that it is not during the-- let me ask that again.

The separation in time of actuation of these does not occur as it does in Flicker. That is, these solenoids can be actuated during a switch scan, the noise could be generated during a switch scan.

A The time of actuation of these solenoids is independent of any timing in the Flicker -- or in the microprocessor control for this game, that is correct, sir.

Q And so no scan curing solenoid closure occurs with respect to the drop targets up here. Is that your testimony?

A That is correct, sir.

Q And so your testimony then is that these two machines, Cleopatra and Disco Fever, infringe at least in part because they have drop targets.

A No, sir.

They infringe in part because, among all the other things that are required in Claim 5, real time, error recovery, they include a combination of hardware noise prevention and software noise immunity to make it operative matrix multiplexing in its intended environment in a practical way.

Q So it is clear, Flicker does not have any drop targets, correct?

A That is correct, sir.

Q And so the Court understands, your testimony is that when these targets go down, the player --

THE COURT: Can we play one of these?

MR. LYNCH: Sure, your Honor. This one you can hit--

MR. SCHNAYER: Which one do you want to play?

THE COURT: Whichever one --

MR. LYNCH: Let's play Cleopatra.

MR. SCHNAYER: You'll have to give me a second.

THE COURT: Okay.

(Brief interruption.)

T8

MR. LYNCH: I think you will see, your Honor, when the new game begins, all of these can be restored to an out-of-the-table position.

You will see five targets come up. That will be the first thing. Could you energize the game, please?

(Brief interruption.)

MR. SCHNAYER: Just push the button.

(Brief interruption.)

MR. LYNCH: You see these five came up. These five colored items came up.

The idea is that if you can knock down all five of them with a ball during one series of play, you get an extra bonus or something.

What I believe Professor Schoeffler was saying was that you get points when they come down, but then when the next player comes along, he is going to have them all up. So he can play the game in that position, and when that occurs, if there is a trip to the switch that occurs when they are being restored to the position, the game does not want to give anyone any points because the only time you get points -- it is strictly a games rule idea.

Let me just illustrate to the Court, if I can. This is going to go right through.

(Brief interruption.)

MR. LYNCH: You see, I have gotten four of them

down. Only one is remaining. Now, the second player is up, or I have a new ball up, and they are restored to their prior position.

So now I have the opportunity of playing the game once again with five drop targets opening my opportunities for bonus as just when I started the first ball.

Now, the game rules might be that I have to knock them all down before I get them restored. In this particular game, it appears to be that with each new ball, I get a restoration.

So the restoration occurs, in fact, when the ball is down here.

MR. SCHNAYER: Mr. Lynch, you are talking about how this thing operates to the Court as if you are testifying. I am not sure that it operates that way. I think these might and in some of the other games, if you knock them down during this play of one ball, they might reset during that same ball.

You are indicating -- the testimony is if that is the way it operates -- we could pull the glass off if you want to know for sure. I just do not want to have the Court misled.

MR. LYNCH: I said apparently.

I asked Dr. Schoeffler what the game rules were on this.

MR. SCHNAYER: He has not --

THE WITNESS: The point, as discussed in the deposition, actually indicated to me that this is the way this was built into the controls for the games. So it would be nothing wrong with, for example -- since this is just a representative game, for someone to have had a game where these did jump up and this debounce routine would be very effective in handling that situation.

That is why I testified about it, and it is why I have included it in my summary, sir.

BY MR. LYNCH:

Q But it does not exist in Flicker?

A Flicker has no drop targets. So that particular debounce problem does not exist in Flicker, that is correct, sir.

MR. LYNCH: Thank you.

Let me see if there is anything else, Doctor.

(Brief interruption.)

BY MR. LYNCH:

Q Just one other matter, Doctor.

You have as two separate items that the boards are in the back box and that the power supply is isolated from the logic board.

Now, are those the same concepts, or are

they different ones?

A No, sir. The boards in the back box means they were put in the back box away from the playfield noise sources, and some isolation of the power supply is present by either putting the power supply or something in the lower cabinet, or if the transformer is there, by shielding is what is meant by this.

So I interpreted those as separate items.

(Brief interrution.)

BY MR. LYNCH:

Q In the deposition that you reviewed, do you know, Dr. Schoeffler, if there was inquiry made, at least in the instance of Gottlieb, as to why the CPU boards were placed in the back box?

A I do not recall any discussion of that in the depositions offhand, sir.

Q Do you recall if in those depositions any inquiry was made by the Bally representatives as to why in either Williams or Cleopatra or Gottlieb's games why the devices were placed in that particular location?

A No, sir. I do not. I do not recall the discussion.

Q Do you recall if there was any inquiry made as to why those particular units used separate boards for the ICs and for the power components?

A No, sir. I don't recall any such question.

Q So, as far as you know, do you know if there was any evidence about any of these machines that indicated the rationale, the reason, for doing these things?

A In the depositions, I don't, sir. In the depositions I read, it was clear that all of the questions were directed toward trying to disclose how they worked and what was -- what the various chips were and things of this nature and not why they were designed the way they were.

Q Now, separation of the power supply from the logic components, would you say that would be a natural reaction for an engineer to design something that way?

A That is a hardware noise prevention technique, sir, that would be well known to an engineer, yes.

Q And likewise, isolating power supplies from logic boards and not putting high power components next to low power ICs, that would also be a well-known technique, wouldn't it, to an engineer?

A It would be known to engineers of the day, I think, sir.

Q With respect to the concept of debounce, I think in your testimony you indicated that debouncing switches was also a rather standard technique.

A It was known to engineers of the day, yes, sir. That's what I testified.

Q Now, I would like to return because I think a valid point was made, Doctor, which Mr. Goldenberg gave me the key to.

So, you indicated that my Exhibit 19-J was somewhat misleading, and let me just in blue -- or green -- add what -- I'll address your attention to it.

On the second line we said switch scan was cyclic and sequential, and in both Cleopatra and Spiderman, it is somewhat different, is it not, than the cyclic and sequential operation of the Flicker?

A In our discussion, sir, we did not agree that it was different in any essential way that would justify writing that down, because I pointed out the fact that in all cases -- not in all cases does the Flicker program also religiously and without exception go from column to column, that under certain circumstances it did things similar to what Cleopatra and Spiderman did, sir.

Q Well, when Mr. Goldenberg examined you, he asked you about that, and he said there is a difference in the way they operate for the Williams games.

He had the diagram up that -- he had Exhibit 13-E up as a block diagram of '441 and talked about the cyclic and sequential strobing.

A But the difference that he was talking about was not in the use of the word cyclical and sequential. It was the fact that in that game they are in three separate matrices rather than in one, sir.

Q And here they're in two. In Cleo and Spiderman.

A That is correct, sir.

Q Now, but it would be fair to call this interrupted cyclic and sequential or cyclic and sequential with interrupt?

A If you did that, sir, it would also be fair to say that for the -- only if you write it also for the Flicker and the '441 patent, sir.

Q Well, your testimony, and I've put it in, is that it's also cyclic and sequential. Is that your testimony?

A Yes, sir. That is right. I'm sorry. I thought you were writing in "interrupted."

Q Now, you indicated there was a difference on the solenoids, and I take it the difference is that the flippers are not driven by the CPU in Flicker. That would be the difference you would put there?

A What I testified, sir, was that the words that are written there are somewhat misleading, as though there was a big difference in these two games.

Both machines have solenoids that are driven by the microprocessor. Both machines have some that are not.

Q. But the flipper has only -- I mean the Flicker has only its flipper solenoids or not.

A. That is correct, sir.

Q. So, if I put here flippers not driven, that would be fair, wouldn't it?

A. And then you should indicate the same for Cleopatra and Spiderman.

Q. Some not -- some driven, some not driven because there are additional ones not driven on these games. Is that fair, Doctor?

A. I think that's fair.

Q. And with respect to the digit scan, it is indeed cyclic and sequential, correct?

A. That is correct, sir.

Q. However, it does use chips that are designed to operate calculator keyboards in a cyclic and sequential fashion, correct?

A. Only Cleopatra. The chip that is used in Spiderman is not significantly different than the chips that are used in Flicker and '441. It's an input/output board.

And so, unless that were modified, it is still somewhat misleading.

THE COURT: Mr. Lynch, I have a luncheon meeting at 12:30.

MR. LYNCH: I have one more question.

THE COURT: One more question? Okay.

BY MR. LYNCH:

Q. Now, you also testified, Doctor, with regard to Exhibit 20-A that the word inferred wasn't exactly the word you would use.

A. That is correct, sir.

Q. I believe in your testimony you indicated you had a conference that involved Dr. Kayton and came up with the word inherent; is that correct?

A. During my cross examination we discussed that, and I asked you to change it to inherent, and you said you'd prefer to just leave it for the record.

Q. So, you wanted to go back and change it because I did use inherent, but I did want to call to your attention, Doctor, Page 928 on your direct testimony.

When you got to noise fix No. 3, you said, "Now, this one," meaning No. 3, "specifically mentions noise immunity that we have been referring to, whereas in the previous one we had to infer it."

A. I recall that, sir. At that point in time I didn't know how to express myself about this sort of thing.

Q. And that was the basis, you will recall, Doctor, on which you put infer here.

A. That is correct, sir.

MR. LYNCH: I have no further questions.

THE COURT: Do you have any questions?

MR. GOLDENBERG: I do, Judge, but --

THE COURT: All right. We'll have to take it up after lunch.

MR. GOLDENBERG: What time?

THE COURT: 2:00 o'clock.

MR. SCHNAYER: Thank you, your Honor.

(Whereupon, the within trial was recessed to 2:00 o'clock p.m. of the same day.)

BALLY MANUFACTURING CORPORATION, a Delaware corporation,

Plaintiff/Counterdefendant,

vs.

D. GOTTLIEB & CO., a corporation, WILLIAMS ELECTRONICS, INC., a corporation, and ROCKWELL INTERNATIONAL CORPORATION,

Defendants/Counterplaintiffs.

Docket No. 78 C 2246

Chicago, Illinois
March 16, 1984
2:20 p.m.

VOLUME XV-B
TRANSCRIPT OF PROCEEDINGS
BEFORE THE HONORABLE JOHN F. GRADY

TRANSCRIPT ORDERED BY: MR. JEROLD B. SCHNAYER
MR. MELVIN M. GOLDENBERG

APPEARANCES:

For the Plaintiff/
Counterdefendants:

MR. KATZ
MR. SCHNAYER
MR. TONE
MS. SIGEL

For the Defendants/
Counterplaintiffs:

MR. LYNCH
MR. HARDING
MR. GOLDENBERG
MR. ELLIOTT
MR. RIFKIN
MR. GOTTLIEB

Court Reporter:

LAURA M. BRENNAN
219 South Dearborn Street, Room 1918
Chicago, Illinois 60604

THE CLERK: Case on trial.

MR. LYNCH: May it please the Court, your Honor?

THE COURT: Mr. Lynch?

MR. LYNCH: I would like to go into one other matter with Dr. Schoeffler.

THE COURT: All right, go ahead.

MR. TONE: No objection.

JAMES SCHOEFFLER, PLAINTIFF'S WITNESS, PREVIOUSLY SWORN

RECROSS EXAMINATION (Continued)

BY MR. LYNCH:

Q Dr. Schoeffler, on this issue of the cyclic and sequential nature of the Flicker and the '441 patent, I would like to call to your attention, Doctor, you testified at page 1047 as follows:

"Frederiksen defined the word sequential. He said that by sequential, cyclic and sequential scanning, he means that we proceed from column to column in such a way that the lamps stay bright enough and not too bright, which implies that if this lamp has had its turn to be strobed or enabled and we move on to the others, that we should complete all those before we go back to this so that it is strobed the right number of times each second so the brightness is correct."

The Court said, "What does sequential add to

cyclical?"

You answered, "It adds to cyclical the connotation that we do not return to this column before completing the others."

The Court inquired again, "Doesn't cycle imply the same thing?"

You said, "The cycle may not. A cycle is simply a sequence of events."

Now, do you agree with that testimony?

A I don't believe I said a sequence of events, sir. Didn't I say set?

Q "It is simply a sequence."

A It says "sequence"?

I believe when I defined it earlier I said a cycle was a group or set of events, and yes, I do agree with what I said there, and of course, that discussion was specific to the lamps and the fact that -- I said I do agree with what I said, and that, out of context, was a discussion of the cyclical and sequential enabling of a single matrix that contained both the lamps and the digits, and the fact that it is a single matrix was significant in that discussion because any deviation from column to column or repeating column would affect the lamps.

In a separate discussion of cyclical and sequential scanning or enabling of the switches, we indicated

that was not the same constraints in the switching.

So I agree with what I said, but it is out of context with respect to the switching.

Q I just want to focus on cyclic and sequential.

Just so we have it clear, it is the case that in Flicker and the '441 patent, that the lamps, the switches, and the digits are in one matrix and they are strobed cyclically and sequentially, correct?

A It is true that they are in one matrix. It is true that they are scanned cyclically and sequentially, and as I indicated in the discussion of cyclical and sequential, that there were at times the Flicker not scanning the switches, but it is still scanning the lamps and digits cyclically and sequentially.

Q. Well, let me pursue that because that is what you indicated, and it is something I don't understand from the software.

A. Yes, sir.

Q. When you begin on Line 1 in Flicker, you begin in Line 1, and you are looking at all of the lamps, all of the switches, and all of the digits in Line 1 of the matrix, correct? You strobe that.

A. You enable.

Q. Or you enable.

A. Yes, sir.

Q. Now --

THE COURT: Excuse me just a second. Strobe means enable?

THE WITNESS: Yes, sir. We are really using that interchangably.

THE COURT: For a long time here, I was thinking scan and strobe were synonymous, but that's not true?

THE WITNESS: I've used the word scan for the whole process of moving through.

The only distinction between strobe and enable is the word enable clearly allows something to happen, and the strobe is the implementation. The lamps and digits go on when you do that. The switches, though, are not read at the same time. So, they are enabled, but not read.

So, we are using them in different context, but more or less synonymously.

BY MR. LYNCH:

Q. Well, if we have, for example, the matrix. Here we have a small figure of the matrix. That is also in the patent, the mux chart.

If we enable or strobe column 1, then sometime during that strobe cycle, we can read these switches in the switch part, correct, and light the lamps in the lamp part, correct?

A. Well, it's not very precisely stated.

The lamps and digits are lit throughout the interval, that is, they are lit when we strobe it or enable it; and then later during that interval, we read the switches offset in time, sir.

Q. Fine. And all of those occur at once.

Now, after that occurs, you go to do the same thing at Column 2, Column 3, Column 4, all the way through, correct?

A. That is correct, sir.

Q. Now, under what circumstances will that sequence in the Flicker game or in the patented disclosure be interrupted once it has begun?

A. The way the software in the '441 or the Flicker game works in general, that is not interrupted at all with respect to the lamps and the digits, but only with respect to the

switches; and that is because the lamps and the digits have to be kept at the proper brightness level.

Q. Now, under what circumstances does one not read switches?

A. In the -- in certain of the sub-routines that are carried out that are very long duration, as I indicated, such as a scoring routine of some kind where the duration of that sub-routine would be too long to leave one of the columns lit all during that time. The sub-routine calls another sub-routine called mux, m-u-x, in the program.

That has the effect of switching over to the next column, that is, strobing or enabling the next column, which immediately lights the lamps and the digits in the next column.

Then the computation proceeds, and then it calls mux again, which has the effect of switching to another column and the lamps and the digits in those columns; but this means that the switches in the intermediate columns were not scanned during that routine.

So, at the conclusion of that routine, the process then starts -- continues, and the switches in whatever column it happens to be in at that time are read.

As a consequence, the net effect is that during certain routines, switches in certain columns are skipped, and it jumps to another column.

Q But --

A. I'd just qualify it once more, if I may, sir.

Now, in several of the instances, the way the software is organized, as I interpret it, that will result in the scan of the switches actually restarting in Column zero, just by the nature of the way it was done.

2b1

Q It will start over at column zero? In other words, we could be in column 6 and restart to column zero?

A There are situations in the program where if you are in column -- I hate to without looking at the specific events that occur, but if you were in a column other than 15, and an event occurs, the net effect would be that the next switches read would be column zero.

I could point that out with just a few minutes, I think, if it was necessary.

Q The scoring, I thought your testimony was, took place after all 16 columns had been strobed.

A That is correct, sir. And so, in that case it would start in zero, but it is going around sequentially.

But in some of the -- when you respond to some of the routines in the test line, you see, what happens is that causes it to go into a routine that I believe is called delay, and that will cause it to go all the way out to the end of the matrix and restart at zero, just as it does in Cleopatra.

Q Now, the routines involved on the test line, are those game routines?

A Certainly, sir. They're all part of the computer program implementing the game rules.

Q But here we're talking about door slam, four coins, three coins, two coins, one-coin credit, correct?

A Yes, sir.
Q And two credit, three credit, four credit, five credit, six credit, correct?
A Yes, sir.
Q That's how many credits you get per coin, right?
A That's correct, sir.
Q Tilt and the credit button.
A Yes, sir.
Q And the test -- the test wasn't active on the --
A That's correct.
Q In fact, -- well, I think Mr. Goldenberg will be going into what was active and what wasn't.
A Okay.
Q But when we are talking about going through the units here, we have one matrix; and except for these special routines on the test line, the lamps and switches and the displays are sequentially strobed, correct?
A I do not believe so, sir. I would want to check the software to be definitive, but the example that I have on this diagram right here is that this would occur when the ball goes into the outhole, namely, when -- that's in column 4. All right?

And I believe what will happen when we put the ball into the outhole where the scan was at column 4, the next column of switches that will be scanned will be column zero.

Q Now, when the ball goes in the outhole of column 4, that means the ball is off the table, correct?

A Off the table, sir?

Q That is the outhole.

A It is in the outhole, sitting in the outhole switch. It is on the playfield, of course.

The outhole -- oh, I beg your pardon. I misspoke. Let me look once more, if I may. I did misspeak.

I was referring, sir, to the 3000 ballhole, which is on the playfield, and I called it the outhole ball, and that was an error.

The software -- when the ball goes into the 3000 hole, it has to be popped up with the solenoid, and the 3000 hole is in column 3. That will cause the software to go through a subroutine called wait, and the net effect of that subroutine, as I recall, will be to reset the next switch line to column zero.

Q I understand.

In that context, in playing the game, have you noted how long the ball stays in the 3000 hole?

A I played the game, and it sits there, and then --

Q It sits there for several seconds?

A There is a dramatic -- well, I assume it is done deliberately to make it dramatic. I do not know that it is done deliberately, but it is there for an appreciable time, yes, sir, but the scanning does

Q When the ball is in the 3000 hole, it is quite clear on Flicker that nothing else can be happening on the playfield, correct?

A The spinner could be spinning.

Q For that period of time, with the spinner being that far away?

A The fact that it is closed for a long period of time does not affect initially the spinner could be spinning, no, sir.

Q Let me then just make it clear. There is one matrix in Cleo, and here you say that you have cyclic and sequential operation that is occasionally interrupted?

A For the switches but not for the lamps and digits.

Q Occasionally interrupted for switches, not for lamps and digits?

A That is correct, sir.

Q Now, just so it will be clear, in Cleo and Spiderman, there is no matrix multiplexing of the lamps?

A That is correct, sir.

Q So can I put here not applicable?

A You are on the lamps column.

Q I will just put lamp matrix not muxed, right?

A The lamps are not in a matrix. I would say lamps, not matrix multiplexing, or something.

Q Lamps not muxed?

A That is all right, yes.

Q That is true in Spiderman?

A Yes.

Q There is a switch matrix, correct?

A That is correct, sir.

Q That is separate from the lamp matrix?

A There is no lamp matrix. It is separate from the digit matrix.

Q Separate from the digit matrix.

And in Cleo, every time you see a switch, it is interrupted?

A In Cleo, every time a switch -- that is correct. You re-start the scan in column 1.

Q So it is cyclic and sequential, but every switch interrupts and starts over, is that correct?

A That is correct, sir.

Q Now in Spiderman, we have a similar situation, except every time you see a switch, you don't start over; you go back to where you were.

A Spiderman is cyclic and sequential, that is correct, sir.

Q But there is an interrupt every time you see a switch, and then you go back to where you were?

A Yes, sir.

Q In Cleo you go back to the beginning?

A That is correct, sir.

Q So theoretically the last column in Cleo might never get looked at, theoretically?

If I am sitting there with my finger hitting a switch, it might never get looked at?

A That is possible, sir, if you contrived it that way.

Q So here I will write, "Same except that start is where you left off."

Is that a fair description; you restart where you left off?

A Why don't you just say it is cyclic and sequential with no mention of --

Q Well, there is an interrupt. Every time you see a switch, you interrupt the cycle.

A That is true -- interrupt the cycle, sir? How are you using that term?

Q you interrupt the cyclic and sequential operation.

You interrupt it, go off and do things, and then come back.

A Oh, all systems do that under all conditions. So that is not a separate -- the proper designation for that would be cyclical and sequential. All of them are cyclic and sequential, and these perturbations are minor and of no consequence.

Q But in that respect it is different than Flicker?

A I don't consider that a significant difference, sir, any more than if every 100th scan for some reason you read one twice just to be different. That is not a significant difference.

Q The digits, we have a separate matrix there, and you are saying that is cyclic and sequential, correct?

A That is correct, sir.

MR. LYNCH: Thank you, your Honor. I have no further questions.

BY MR. GOLDENBERG:

Q Dr. Schoeffler, do you have Exhibits 467-B and 467-A available to you?

A Are those the --

Q (Indicating)

A Yes, sir, I do.

Q 467-A is what?

A It is what I call the structure chart, sir, and I drew that to illustrate what the patent teaches about the rela-

tionship --

THE COURT: Excuse me.

THE WITNESS: I am sorry.

THE COURT: I think you are referring to B. At least that is the way my --

MR. GOLDENBERG: I am sorry.

BY MR. GOLDENBERG:

Q Well, first tell us what 467-A is. I misdirected your attention. I apologize.

A All right, I drew both A and B together to illustrate what the program filed with the patent would teach about the invention, and in A, this is a flow chart showing the critical sequence of events in the executive loop, which causes the cyclical and sequential scanning. It illustrates the offset in time for the noise immunity offset in time, the double reading of the switches, and so on in the routines in the patent.

Do you want me to continue with B?

Q Yes, sir.

A In B, that is what I call a structure chart, which shows one rectangle for each group of instructions that is named or labeled in the program filed with the patent and illustrates the relationship among them, that is, which routine calls or executes or jumps to another routine.

That is commonly in programming called the struc-

ture of the program, sir.

Q Do I understand correctly, sir, that you prepared both 467-A and 467-B based on the program listing filed in the Patent Office?

A That is correct, sir.

Q. You had no reference to anything else?

A. That is correct, sir. I did do it after I studied the others, but I did this with the intent of doing it from a program in the patent, and I believe that is all that is on there, sir.

Q. When you said that you did do it after you studied some others, those others that you studied, was that the program as disassembled from the ROM contents by Mr. Frederiksen?

A. That is correct, sir.

Q. He did that on January 19 or 20, isn't that correct?

A. The copy I had had that date on it. I did not receive it until into the break a few days.

Q. Would that be the document that has been marked here as Exhibit 466?

A. Is that the one with the colored square?

Q. (Indicating)

A. That is the one, sir.

Q. Did you have recourse to anything else to prepare those two exhibits?

A. The 4004 manual, of course, sir, which defines what the instructions are in the machine, is the only other material.

Q. Let me show you a document that has been marked within the past few days as Defendants' Deposition Exhibit 513, and I would like to mark it now as Defendants' Trial Exhibit 22-A.

I show you Defendants' Exhibit 22-A, and I ask you

if you have ever seen that before?

A. This is another document that contains a disassembly of the program that I did see after I had received the one with the asterisks in the columns.

I prefer to use the one with the asterisks in the column because it displays the differences instruction by instruction between the program that was filed with the patent and what was dumped from the ROM; whereas, this does not so show it.

Q. This does, however, include what computer programmers call comments?

A. Yes, sir, it is a very heavily commented version of the program.

Q. Could you explain what comments are on a computer program listing?

A. Yes, if you recall the copy of the program that was filed with the patent, down the middle of the program are the individual instructions that are executed, which are written in the language of the 4004 microcomputer.

Q. Here you refer --

A. Down -- I am sorry.

Q. Here you are referring to Exhibits 30 and 436, is that correct?

A. I don't remember the number, sir.

Q. Well, here is 30.

A. That is the one I am referring to, sir.

Down the left-hand column of that exhibit for each group of instructions there is a title or a name, and that is the name of the routine that I put in these boxes here, but down the right-hand column, every once in a while there is an English language statement. For example, the one that is in there is "Ignore noisy switches," and there are other things like that.

Those are called comments. They are commonly written by programmers along with the symbolic code in order to make the meaning or semantics of the computer program a little bit more apparent to someone who is reading it.

Q. Can you and I agree, sir, that the Exhibits 30 and 436 -- I think 436 was the one actually submitted to the Patent Office -- and this most recent production of Mr. Frederiksen, there is a substantial difference in the extent of the comments made available to the reader by the one who prepared either one of those? One is far more heavily commented on than the other?

A. That is correct, sir, oh, yes.

Q It gives quite a bit more information, does it not?

A It does give quite a bit more information about the detailed computational sequences in each module. That is one of the reasons I produced this diagram. It does not change the information disclosed about the structure or the portion of the program that is pertinent to the claims.

Q But I think it is your testimony, sir, that in order to produce 467-A and 467-B, you had recourse to this recent work by Mr. Frederiksen in disassembling the actual program loaded into the memory elements?

A No, sir. That is not my testimony. I had nothing to do with the disassembling of those programs.

Q I understand that, sir, but you studied it prior to the preparation of these two exhibits, 467-A and 467-B.

A I had seen it, and I had looked at it. I have been studying the program as filed with the patent for many months, and when I received the one with the asterisks on it, which is dated January 20th, or whatever it is, I studied that in detail.

Then when I eventually received the last version, I studied that in detail. But when I prepared these two, I used only the material that is in the program that was supplied to the Patent Office, sir.

Q Why didn't you prepare those --

If those were useful aids in explaining the

Flicker program, the patent, the program somehow associated with the '441 patent, why wasn't this done earlier in the case?

A Because this really became reasonable to do and bring into the Court only when the question would arise: Would there be additional information in the dump program that is not in the one that is filed with the patent that would teach -- I am saying it badly. May I say it again -- is the program that is filed with the patent insufficient to teach the invention whereas if the additional information that were in the PROM were available, it would be.

I did this at that point in time to show that it would not add anything to the teaching of the patent; that is, it is totally sufficient to teach the important aspects and how to build the invention from a program organization, real time response, and software noise immunity considerations, sir. That is why I did not do it earlier.

Now, actually, in my own work, to understand the program, when I first received it, okay, I did do things like this, but I did not do them formally and nicely pictured like this.

Q Can you agree with me that there is nothing like Exhibit 467-B and 467-A within the patent itself?

A Yes, sir.

Q All that the patent has about the computer program is this listing that was submitted and is identified here as Exhibit 436?

A That is included in the patent.

In addition, however, the program is mentioned in the patent, and the 4040 manual is mentioned.

As I stated, it was and is my opinion that someone who took the 4040 manual and learned how to read the code for that particular microprocessor could produce these.

Q Could produce what, sir?

A The structure chart and that executive loop flow chart that I have drawn, sir.

Q All right, I am looking for the mux chart.

A It is right here, sir.

Q It gets around.

Now, isn't it correct, sir, that someone reading the patent, in looking at this mux chart, wouldn't he believe that the programmer had provided information so that the various -- the effect of these various switches on the left-hand side of the switch matrix and the switches in the test line, that those would be provided for, and the system would be able to act upon the closure of any one of those switches?

A I do not know what a programmer would think.

The purpose of the patent, it is my understanding,

is to teach how to do that.

The purpose in this mux chart clearly is there showing things with only one switch in a column, and all these other combinations that we have talked about for noise immunity and for organization, and that plus the program would show him how to respond and build a pinball game of any structure.

The purpose is not to teach him how to do the Flicker pinball game, nor, in fact, in the patent is there any information about the game rules, so that, you know, the bonuses and so on that might be associated with that.

So I do not see that he would be looking for that kind of information.

Q You don't believe a reader of the patent would believe that Mr. Frederiksen had provided a means that whereby if some switch called 65K were closed, the system would react to that and register some kind of an effect, be it a score or display of some kind?

A He would believe that Mr. Frederiksen is teaching how to do that. Whether he cares whether Mr. Frederiksen did that or not in a particular machine, I have no way of knowing.

Q All right, sir, but now wouldn't it also be the fact that when he actually studied -- if he ever got a chance to study the contents of the E-PROMs in the Flicker game, he'd find out that that was not provided for?

A It is true that the implementation of the switches that we call the parameter set-up switches, those were not intended to be implemented, as I indicated earlier, because they were not implemented in the software in the -- by Frederiksen.

Q So, within the four corners of the patent document, there is no way he could find that out, is there?

A By he, you're referring to someone who is reading?

Q A reader. A person skilled in the art.

A And there's no way he could find what out, sir?

Q That these switches had not been implemented.

A I don't believe that within the patent he could figure out whether anything had been implemented.

The patent described a preferred embodiment

of the game. There is not a complete -- a schematic. It is not intended to teach, as I understand it, the electronics and the details. There are no chip numbers for the Flicker game and so on.

So, he would not be reading the patent to query Frederiksen. He would be reading the patent to determine how to do that; and the patent, I believe, together with the program, clearly teaches how to organize the software to do these things.

Q Does it teach how to organize the software to give effect to these switches on the left-hand side of the mux chart?

A What it -- it does not through the program listing give you the sequence of instructions for the 4004 microcomputer that would be working with the particular Flicker hardware to do the bonus and replay and match considerations that apparently are in the game rules of Flicker.

Q Does it teach, sir, that when -- how a preferred embodiment in the sense that when a ball goes into the 3000 hole that what you do is to use one of these -- the location for one of these switches on the left-hand side in order to accommodate that in the program; or do you know whether or not that's what happens?

A I assume, sir, that you are referring to the patches that Frederiksen stored in the ROM in the place where some of

these set-up switch instructions would have gone when you ask that question, and it is not appropriate to teach that.

The 4004 programmer's -- 4004 user's manual teaches you how to do the elementary programming things.

He is teaching you how to structure a program, how to do the real time, the error recovery, and things of -- these were the things the digital logic designer of the day did not know.

If all he was going to do was calculations, here's how you add two numbers together, here's how you add on a bonus, and here's how you write the instructions, those -- that was already well known. It's in the 4004 manual.

That microprocessor has been used by calculators. Calculators do instructions like that all the time.

The patches, those extra instructions that I assume Frederiksen or someone stuck into that area, was strictly something that is done in the normal course of events of debugging a program at the final stages and is not part of the structure of the program nor what the patent should be teaching, sir.

Q Well, but isn't the effect of that, sir, that those deficiencies in Exhibit 436, which is, I think, the one submitted to the Patent Office, isn't the effect of all that that that program is inoperative and will not make that Flicker game work?

A It is true, sir, that if you take the program as submitted to the Patent Office, that symbolic program, assemble it -- it's got to be changed into the object code of the machine -- and load it into the PROMs and turn on the Flicker, it will not run the Flicker properly. That is correct, sir.

Q It won't run it at all, will it?

A Well, I don't know what it would do, but it would not run it correctly.

Q It would not be an operative or a practical pinball game?

A If the patches were not put into the program in addition to what was produced, it would not operate the pinball game successfully. That is correct, sir.

Q So that the computer program submitted to the Patent Office and offered in evidence at the trial of this case was misleading and incomplete, was it not?

A I do not believe that's true at all, sir. I believe that program is complete and sufficient to teach all of the things about the invention, and that's why I drew these charts.

And I further believe that a person who was, for example, going to use a microprocessor like the Motorola 68 and studied this diagram, that's all he would need. He would not be interested in the detailed sequences of the 4004 microprocessor instructions in how to do addition. That's a totally different microprocessor. I believe this is sufficient.

Q Studied what diagram, sir?

A I'm sorry. What I meant to say is studied the patent with the program that was filed with the patent is what I said was sufficient to teach the invention.

Q Are you familiar with the patent to Messrs. Bracha and Englehart? It's 4,198,051.

A No, sir. I've never seen it.

Q And it's in Trial Exhibit 12-B.

A I've never seen it, sir.

Q You've never seen it?

A No, sir.

Q All right, sir. I think my questions I'm about to put to you do not require a detailed study of that, however.

I show you a copy of that patent --

A Yes, sir.

Q (Continuing) -- and I direct your attention to sheet 5 of 16 of the drawings of the patent.

A Yes, sir.

Q And I invite your attention to that and some of the succeeding sheets of the drawing, which, I think, you go from 16 -- go from 5 of 16 to sheet 16, and I also direct your attention to the listing, program listing, starting at columns 5 and 6 and continuing through to columns 69 and 70.

And just take a few moments and turn through that. I'm not going to ask you any questions about its specific content or anything.

A I'm glad of that, sir.

Q We'd both be in trouble.

A I've looked at it, sir.

Q All right, sir.

I take it there is no dispute between us that those drawing figures are what computer programmers call a flow diagram.

A That is correct, sir.

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Q And the other pages I referred to you is a program listing?

A. That is correct, sir.

Q. There is no flow diagram in the '441 patent, is there?

A. That is correct, sir.

Q And in the '441 -- well, not in the '441 patent, but in Exhibit 436 can't you agree with me that there are rather a bare minimum of comments added by the author of the document?

A. I'm sorry, sir. Would you repeat the question?

Q In the '441 --

A. In the '441 --

Q Well, in Exhibit 436, it is not heavily commented, is it?

A. Sir, there are 10, 12, 6, 8, 15 comments per page. I would not agree that it is inadequately commented, no, sir.

Q I didn't say inadequately. I said heavily.

A. That is a level of commenting which is normal, sir.

Q Well, it is --

A. A quantity of commenting.

Q Well, it is certainly not as heavily commented as is the Exhibit 22-A.

A. That is correct, sir.

Q And it is not as heavily commented as the programming listing in the Bracha patent.

A. That is correct, sir.

Q. Isn't it a fair statement to say that in the Bracha patent, far more information about the program is provided to the reader than what has been purportedly provided to the reader of the '441 patent and Exhibit 436?

A. It is fair to say, sir, that the volume of information is more. It is clearly the level that we would conventionally call for or require if someone were going to maintain that precise particular program.

In other words, over the years if it were a product I were manufacturing, I would need to have that level of detail so that if ever I needed to make a change and so on, I could do that economically.

I do not agree that that level of commenting is necessary to understand what Frederiksen was teaching in this patent, namely, the structure of the programming so -- the program so that that software could come -- cooperate with the hardware and carry out the cyclical and sequential multiplexing with the time offset reading of the switches, the double reading, and the other elements which I stress.

Furthermore, the detail that is in this listing of the program that's in the -- the Bracha patent you called it-- is -- I just lost my train of thought on the second comment.

Q. Take your time, sir.

A. It does not return to me, sir.

THE COURT: Just like some of my best ideas.

BY MR. GOLDENBERG:

Q. All right, sir, have I left a copy of --

A. Yes, sir, they are right up here.

Q. -- 436?

Do we have another copy for the witness?

(Brief interruption.)

THE WITNESS: My thought came back to me, if you would like to hear it, sir.

BY MR. GOLDENBERG:

Q. Yes.

A. The difference in those patents, as I recall the date on the top, is five years in the filing, and I think the date on that was 1980, did I see in the corner?

Q. The Bracha patent?

A. Yes, sir.

Q. Well, no, you did see an issue date of April 1980. The patent, however, was filed in November of 1975.

The '441 patent application for that was filed in April of 1975.

MR. SCHNAYER: May 13.

MR. GOLDENBERG: I am sorry, May of 1975. I mispoke.

THE WITNESS: Then my comment was inappropriate.

BY MR. GOLDENBERG:

Q. What were you going to say?

A. I was just going to question whether perhaps -- I had no knowledge of why -- I just wondered whether rules had changed or anything like that during that interval.

Q. All right, sir, with Exhibit 436, could you turn to page -- well, let me call it listing item 291. There is no page -- oh, it is Page 4, Page 4.

A. Yes, sir.

Q. Could you explain to me what happens at that stage in the functioning of the program?

A. In the range of where, sir?

Q. I am sorry?

A. Exactly where, on the whole page or --

Q. No, at 291, tell me what is happening there.

A. There is an instruction there that says, "Increment and skip on zero, register 4 to self minus 11."

Q. What does that mean?

A. That "Increment and skip on zero" is an instruction which adds 1 to register 4, and unless it is zero, jumps to 11 bytes or character positions earlier in the program, which would be up around -- I would have to count and look up all the lengths, but it would be around 280, 281 or '2 or something.

Q. Then what happens?

A. It would be just continued execute instructions in that region, sir.

Q. Suppose it is not zero; what does it do?

A. If it is not zero, it does the jump backwards. If it is zero, it continues.

Q. The next instruction, if it continues, is to jump to main, is that correct?

A. That is what it says, sir.

Q. Would you have a copy of your -- well, let me withdraw that for the moment.

What is happening at that stage of the program? What is the processor doing?

A. As I recall, that is in the coin routine, and according to the comments there, in the coin routine it has to know how many credits the coin is worth, and it is supposed to knock -knock, make sounds according to each credit, is my understanding of what the routine does.

Q. Sir, would you turn to Exhibit 466, which I think you had a hand in preparing?

A. I prepared this by myself, sir.

Q. Can we look at the same instruction there?

A. Oh, I beg your pardon. I am looking at the wrong -- effected by Mr. Frederiksen within the past several weeks.

Q. Again Page 4, and this is the disassembled program

A. I don't have a copy that is colored up. Do the colors

matter? I have a copy of the exhibit without the colors, is that all right?

MR. RIFKIN:(Indicating)

THE WITNESS: Thank you.

BY MR. GOLDENBERG:

Q You are the one who added the colors, did you not?

A Yes, I did.

Q Okay, let's go to 291 again.

A All right, sir.

Q We are still on page 4.

A Yes, sir.

Q Now,what does it say?

A It says:

"Increment and skip on 09118," which is one of the reasons I had colored that line in with yellow.

In my brief summary yesterday, this is the debugged version, of course, of the program that was submitted with the patent. What I did --

Q Now,--

MR. SCHNAYER: Excuse me, your Honor. He was answering the question.

BY MR. GOLDENBERG:

Q Go ahead.

A What I had indicated in my summary, there was one large group of errors that were corrected that was apparently a common cause: namely, a register conflict was the word I used. And you will notice on my colored-in diagram, I have written, "R4" out far to the right of that.

What I meant by that is this instruction referred to register 4 previously. Now it refers to register 9. If you look up the page, you will see lots of 4's and 9's being interchanged.

What I attribute that to throughout this debugging was he had allocated information to registers and different parts of the program, discovered a conflict, and had to go through and make lots of these changes.

Q Well, now, I think you said before, if it was a zero, it just went back and started all over again, and if it was not a zero, it continued on, is that correct?

A In the -- yes. This is the increment skip on zero.

Q Right.

A If after adding something to register 9 it is zero, is my recollection of the instruction, it will continue to the next line, which is now an unconditional jump to location 1DA, all right.

Q Where is 1DA?

A Okay. If you go to page 7 -- if you go to page 7 on this listing, you will find 1DA is at line 474.

Q Now, we believe that that is a coin sub-routine patch.

A It is asterisked. It is a patch in the coin sub-routine. That is precisely correct, sir.

Q Now, didn't you testify earlier, sir, that the only thing excluded from the program listing was what you called this table?

A. No, sir.

Q Well, let me come at it this way.

If you turn to Exhibit 436 at page 5 --

A Yes, sir.

Q -- and we come toward the bottom of the page, and we are at location 429.

Do you see that?

A I do, sir.

Q Then there is a jump to 512?

A That is correct, sir.

Q Now, that means something was omitted from this program listing submitted to the Patent Office, was it not?

A No, sir. It does not mean something was omitted.

What it means is that in those locations from 429 up through 512 or within one of those is where the so-called jump table would be, but the jump table is not in his symbolic program. It is my understanding that what that does is leave space in it, so that after it is assembled, he can hand enter all the various jump -- jump numbers. It does not mean anything was omitted, sir.

Q Well, it was not listed, was it?

A This is a listing of the symbolic program. It is my understanding that the jump table was not implemented symbolically in 1974 in this kind of a program, sir.

Q Where did you get that understanding from?

A That is my recollection of the early assemblers for the -- at that era. Nowadays, one would not do things like

this, but I believe that is what I recall from that era.

However, whether that is correct or not is immaterial. This notation here is the conventional notation to stop at that point and jump over to the next point, and all it does is allocate space in a program.

Q What is a jump table?

A When this routine -- let's see which one it would be better to show it on.

Q Well, let's take the one we are working on.

A I was going to say there are two halves of that diagram. I was going to look to see where it is clearer. I cannot find it.

(Brief interruption)

BY THE WITNESS:

A (Continuing) Where is the other exhibit, sir, the A part?

I think it is a little clearer on -- well, maybe it is not because it is larger on B. I will use B, if I may.

BY MR. GOLDENBERG:

Q Surely.

A You will notice that when the program flow coming down in the top right-hand corner goes through that thing that I called the switch processing routine -- right there. You just passed it, sir, up one inch.

Q Oh, yes.

A And at that point, there is a very heavy flow that then sort of encompasses all of the many routines.

What that means is for a particular switch, we now have to find out which routine to use to process it, and that is the information in the jump table. And what Frederiksen does in the program, and it is clear from the listing in the inter routine, the few instructions there, that he calculates a location in the jump table, looks up that address, and then goes to there.

That is what space has been allocated for here. The actual addresses that appear in there are not present in the patent.

Q So the jump table is not included or was not included in the submission to the Patent Office?

A That is correct. It is not explicitly there. That is correct, sir.

Q Now, isn't it a fact that the so-called jump table is really more than a jump table?

A You are referring to the patches that he put inside, sir?

Q Yes, sir.

A That is correct. The jump table -- because he was not implementing, for example, those parameter switches, he had some extra space, and so some of the errors that he was debugging, he needed space to put the instructions. So he put them inside there.

Q So included within this jump table, which actually resides in the Flicker memory, is not only the jump table but, indeed, a number of patches which were necessary to make the system work?

A To produce the de-bugged version of the program, there are a series of what is about a dozen patches, a small series of instructions.

Some of them he put in that jump table, and the others he put at the end.

And to make the program work so that it will actually run the Flicker machine, you do want the debugged program. You do want those patches.

Q Can you agree with me, sir, that even though you had studied the Exhibit 436, prepared this Exhibit 467, that you really did not know what was happening at that location 291 until you had a chance to look at the disassembled complete program prepared by Mr. Frederiksen?

A No, sir. When I studied this --

Q. And what is "this"?

A. -- I did not -- this is 436.

Q. 436.

A. I did not study each and every routine and each and every instruction in each routine to see how the game rules were implemented, and furthermore, when I received the debug version, I did not study each and every one of these modules to determine precisely how the calculation was done or why it was done.

I studied these programs to determine the structure of them because that is what one would do if you were trying to learn how to read the invention.

You would do that kind of study of these individual routines, in my opinion, only if you were going to build Flicker itself, and it would still be meaningless unless you had the schematics for Flicker, and they are not part of the patent.

I did not study it from that point of view before or after. The only exceptions were that I tried to look through to determine if I could why the patches were necessary so I could explain a few of them, but I could not go through each of these routines today and tell you line for line and instruction for instruction exactly how he is calculating the bonus in all of these things.

It is irrelevant to the patent, the discussion, the

use of the program, or anything else.

Q. I think you would concede, sir, that if a person of ordinary skill in the art at the time had available to him a complete, accurate operative program listing, a flow diagram, his ability to understand what Mr. Frederiksen was trying to achieve would have been much, much simpler, would it not?

A. Yes, sir, and if Mr. Frederiksen were there to explain it, it would be even simpler than that; but what they did have is adequate, in my opinion, for that purpose.

Q. I think you said in response to a question on your redirect that there was an 88 percent identity between the disassembled program and the one submitted to the Patent Office. Is my recollection correct on that?

A. I didn't use the word program. I said instructions.

Q. Instructions.

A. I actually counted instructions and then counted the number of asterisk lines, and unless I did the arithmetic wrong -- and I have it right here -- I came up with 87 instructions changed out of 672 listed.

Q. With Exhibit 466, I note there are no asterisks --

A. 466?

Q. 466 (indicating).

A. Yes, sir, I have it, yes, sir.

Q. I notice there are no asterisks entered beside the items of this jump table, which goes from pages 6 to 7,

lines 429 through 511. So you didn't count that, did you?

A. No, sir, because what was submitted to the Patent Office, that wasn't there at all, and so I didn't count the jump table and I didn't count the patches taxes at the end. Just line for line is the way I arrived at those numbers.

Q. So the 87 point something percent really is much lower than that if we factored in all of the omitted items?

A. You can create statistics and make the numbers come out any way you like; I agree with that, sir.

All I was trying to do was point out what I indicated yesterday was very significant and important in realizing that this is just a debug version of the program; namely, all those instructions are in the identical place. It is not a different program. It is the same program with just changes made to it, and the number of change instructions that I counted was 87.

Q I am saying that if you had included in the items missing the patches, the jump table, the number would be much greater, would it not?

A If I phrased it the way you just did, that is right, the things that are not present in the Patent Office listing, the numbers are higher, that is correct, sir.

Q Do I understand correctly that your position that the Atarian pinball game does not infringe the '441 patent is because it does not matrix multiplex the switches, is that correct, sir?

A It is my position that none of the claims in suit read on the Atarian machine because the switches are not matrix multiplexed, that is correct, sir.

Q You include in that Claim 45, which Gottlieb and Williams are charged to infringe, even though it only calls for multiplexing, is that correct?

Do you want to turn to the claims?

A Actually I would like to hear your question again, sir. It confused me.

Q I gather that is your position with respect to Claim 45, and we can start at the beginning or we can turn directly to the particular clause that I think you should think about, Clause (g).

You say that it doesn't infringe this Claim 45, even though this Claim 45 only recites multiplexing as a

requirement?

A Claim 45 recites multiplexing means, and multiplexing means, et cetera, when I go back with this means and function language of the patent, as I have said probably too many times now, clearly to me reads as matrix multiplexing and nothing more general than matrix multiplexing is being claimed in that patent.

Q All right, sir, if we were not to read matrix multiplexing but simply take the English language as it stands, "multiplexing means," is there multiplexing means in the Atarian pinball game?

A I have previously testified that the switches in the Atarian pinball game use time division multiplexing; that they do not use matrix multiplexing, yes, sir.

Q That is your sole reason for coming to the view that the Atarian pinball game does not infringe the '441 patent?

A That is correct, sir, but I must qualify it.

When attempting to read the claim on it, as soon as I found out that it did not do matrix multiplexing of the switches, I stopped reading at that point. So I really don't know anything else beyond that.

Q You don't know whether the displays in the Atarian pinball game are matrix multiplexed?

A As I recall, Mr. Lynch showed me a diagram in cross examination that appeared to indicate that -- I can't even

remember whether they were the lamps or the digits now were matrix multiplexing, but because of all the time spent on the program, I have never gone back to investigate whether or not I would agree with that after careful study.

Q Well, sir, if you could assume that the displays are matrix multiplex, would your answer still be the same?

A That it does not infringe?

Q Yes, sir.

A Absolutely, sir. Claim 45 requires the matrix multiplexing of the switches and at least some of the displays, in addition to all the other elements, which I won't repeat.

Q All right, sir. I would like you to turn to your Exhibit 469.

THE COURT: Before we do that, why don't we take a short recess?

(Brief recess.)

BY MR. GOLDENBERG:

Q Dr. Schoeffler, a few moments ago during our recess there, I handed you two photographs. One has been identified as Plaintiff's Exhibit 471 and the other as Defendants' Exhibit 22-B.

A Yes, sir.

Q Have you had a chance to examine those photographs, sir?

A After you gave them to me, I looked at them both, sir, yes.

Q If you would look at Defendants' Exhibit 22-B.

MR. GOLDENBERG: And, Judge, I think I may state these are photographs of the logic board in the Flicker game taken during the recess.

BY MR. GOLDENBERG:

Q And if you would look at 22-B. Can you identify the white elements at the bottom of the photograph?

A Would you show me which is the bottom? These?

Q Yes, sir.

A Those are the E-PROM chips, sir.

Q And those are the chips that have the computer program stored in them; is that correct?

A That is correct. There are four of them, sir.

Q All right, sir. You, I think, have testified you are familiar with manufacturers' date codes; is that correct? Somewhat.

A Somewhat.

Q Can you with reference to this exhibit state what the date codes on any one of the four E-PROMs indicates to the extent that you know or believe you know, sir?

A I'm afraid, sir, that I don't even know how to read the date codes on the Intel E-PROMs.

I know what date codes are in general, but I do not know how to read those codes.

Q All right, sir. So that you can't help us.

You wouldn't know in the center two E-PROMs it says 7440 and then gives a number. Would you have any idea what those date codes mean in usual practice?

A First, I don't know that it is a date code, but if it

is a date code, the usual practice would be, I suppose, 1974 the 40th week, but I don't work with date codes. So, I don't really know what those are.

Q All right, sir. Well, we'll deal with it another way.

Let me direct you now to Plaintiff's Exhibit 471, and I understand that photograph to be a photograph of the logic board of the Flicker game where all the chips or components have been turned around, but maintained in the same position that they are on the board.

A Or at least some of them, sir.

Q Some of them have been turned around and maintained in that same position.

A Yes, sir.

Q Can you agree with me that this chip over in the corner with the legend Malaysia on it and numbered 5 is one of the E-PROMs?

A It certainly appears to be one of the E-PROMs. It's in the correct position for that.

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Q And to answer that question, you are comparing Exhibit 22-B and Plaintiff's Exhibit 471, is that correct?

A That is correct, sir.

Q Can you agree with me that the date on this E-PROM with the number 5 on it is 10/25/74?

A Yes, sir, pencilled in in handwriting.

Q That is some period of time, is it not, after the supposed operation of the Flicker pinball game in September of 1974?

A October of '74 is some time after September of '74, sir.

Q Okay.

Now, I would like you to direct your attention to Plaintiff's Exhibit 469.

This is the tabulation you prepared and was characterized as an infringement summary?

A Yes, sir.

Q I notice for each accused machine, Williams and Gottlieb, the items include self-cleaning digits and self-cleaning lamps?

A That is correct, sir.

Q Now, do I understand correctly what you mean by that is that in a multiplex matrix, that if there is a mistake and you come back on the second scan, there is a good chance that that error will not have persisted; so as a result of this matrix multiplexing, errors such as [illegible] stuck switches

or lamps that are not lit or should be lit, that kind of thing is going to be corrected?

A Yes. This is not referring to switches. It is strictly in digits and lamps.

Q I am sorry.

A But that is correct.

If a momentary noise pulse gets beyond all the hardware noise prevention, and so that you inadvertently light the wrong light, hopefully, since it is a random noise error, it will not repeat and will go away on the next cycle. And since the cycles are so fast, it would be lit for only a 60th of a second or something. You would never notice it.

I am sorry. It is not lit for a 60th. It is lit for one millisecond, isn't it, in the matrix multiplexing?

Q I think you had agreed with me earlier that that is just inherent in any matrix multiplexing system of displays and lamps for as long as such things have been known?

A It is inherent in a matrix multiplexing system that is cyclically and sequentially enabled, that is correct, sir.

Q Cyclically and sequentially enabled matrices have been known for some time, have they not?

A The matrix multiplexing of digits was known at the time, yes, sir.

Q Prior to Mr. Frederiksen's work?

A It was known at that time. I have no idea when the

concept initially arose, but it was known at that time, sir.

Q Well, it was in the Intel manual, wasn't it?

A The Intel manual, it was in one of the documents there, sir.

Q I am sorry?

A It was in one of the documents, sir. I think it was in the Fairchild document.

Q You also include on your summary, "Switches double read," and again that is for all of the accused games, isn't it?

A That is correct, sir, all of the depositions indicated that double reading of switches was used in all those games.

Q That, too, was a technique known before Mr. Frederiksen's work, wasn't it?

A The double reading of switches for handling of internal noise was in the Intellec manual. There was no mention of double reading of switches for external noise.

Q But as a noise elimination device, it was in the Intellec manual, was it not?

A It was very specifically there in all the discussion for internal noise, yes, sir.

Q With reference to this Exhibit 12-E, explain to me how the double reading works in the '441 patent as you understand it.

A In the program that is part of the patent, whenever the switch in the test line is read and whenever the column of switches in the switch matrix are read, they are read twice, with the results in effect compared to see if the two readings yield the same result.

Q Are they read twice on the same scan?

A They are, sir, and very close together in time, separated only by -- well, by no instruction in the case of the test line, where there are two successive instructions, and by, as

I recall, one or two instructions in the case of the switch matrix.

Q. So if it is sitting here on Column 1 and a switch is closed, before it moves on to Column 2, it takes two readings of that switch?

A. That is correct, sir.

Q. Is that the same thing that is done in the Williams games?

A. In the Williams games, in the depositions, that is the way the depositions read.

Q. What deposition do you have reference to, sir?

A. The ones I testified to. Dussault was one of them.

I would have to look at them all again to see all they were, and I would have to refer to my notes to find the pages where he indicates that the switches are double read.

Q. Sir, if you were to assume, as I have been informed, that in the Williams system the double reading is accomplished on successive scans; in other words, on Scan No. 1 and that is completely across the matrix -- and I am just asking you to assume this, sir -- if a switch is closed, the scan comes on and then when it comes back again, if the switch is still closed, then that is the Williams version of double reading.

If you can assume that what I have told you is correct, that is different, of course, than what occurs in the Flicker game and in the '441 patent, is it not?

A. Even if we assume that, sir, it wouldn't be substantially different.

If you recall in the Williams games, the switch matrix, the entire matrix, is scanned 500 times a second; whereas in the Flicker game, the matrix is scanned only 60 times a second.

At 500 times a second, that is every two milliseconds. There are 8 columns. So that would be every 250 microseconds, and so that would be the successive reads of the switches would be separated in time by 250 microseconds.

That is longer, indeed, than it is in the case of the Flicker game, but those are times which are comparable, so it would produce an equivalent effect.

I would call that a variation but doing effectively the same thing.

It is not the same as the debounce, which is in the Williams game and in the Flicker game and which has to be done over a longer period of time to make sure the switch is valid.

Q We are just talking about double read, sir.

A Yes, sir.

Q If I understand what you just told me, simply because these double reads are close together in time, they are the same thing; is that what you are saying?

A No, sir, I said and I testified that the purpose of double reading switches is for noise immunity. In other words, if noise gets beyond the hardware noise prevention, because noise is relatively brief in bursts, double reading it gives you a better chance of not getting the same reading on the two successive reads.

So there is a difference in time, but I think it would have a similar effect, sir, the same effect.

Q Isn't another purpose for double reading to make sure that this is a switch which is legally closed?

A As part of the debounce routine, that is also commonly done, but it would also include in the case -- legally closed is what we used the debounce --

Q Is the debounce.

A Right, but that would also include having previously read that it was open so that you are not giving credit twice for the same switch.

Q I understand that, sir, but in the Williams system, as I say, assuming what I am stating is correct, where this double reading is done on successive scans, which means an

entirely different softwear approach than the software approach taken by Nutting, you are still saying that is the same?

A I am not saying that the sequence of instructions would be the same in the program.

They wouldn't be in any case. They are different microprocessors with different instructions.

All I am saying is the effect of that would be the same, and so that would be a good way to provide noise immunity also, sir.

Q But it's a different way, is it not?

A It is not precisely the same because it is not done on successive instructions. That is correct, sir.

So, it is different in that sense if you're looking at it in that narrow sense.

Q Well, it's only the same in the sense that there's double reading of the switching. The apparatus used is different, and the way the apparatus is used is different, is it not?

A The matrix -- matrices are separate, and they are different size; but the key thing in the reading of Claim 45 is the noise immunity function and not the sequence of instructions that are coded by a programmer to carry it out.

So, it is -- in that sense it's the same. In the sense of identical with identical instructions, it's different.

Q Can you agree with me that the software approach is also different? It's a different set of instructions?

A It is a different set of instructions, sir, yes.

Q Thank you.

MR. GOLDENBERG: I have no further questions.

THE COURT: I would like to ask a question, Dr. Schoeffler.

THE WITNESS: Yes, sir.

THE COURT: You've said that these noise prevention

devices are in some cases inherent in the particular structures shown in the specifications.

THE WITNESS: And the example of that was the matrix multiplexing where if the designer selects that hardware structure and then cyclically and sequentially enables it, he is accomplishing both the noise prevention and the structural organization at the same time. That is correct, sir.

THE COURT: In connection with that discussion, you testified that the noise prevention characteristic of these particular devices would have been obvious to engineers skilled in the art.

Do I understand you to say that it's because of that obviousness that it is fair to characterize these noise prevention aspects as being inherent in the devices?

THE WITNESS: No, sir. The meaning of the word inherent is if you decide, for whatever reason, whether you're thinking of noise or anything else, to use matrix multiplexing of the lamps, and you cyclically strobe them over and over again.

It will be self-cleaning just by the very nature that you keep outputting the information to it; that is, you don't have to do something special in the hardware or the software to make it self-cleaning. The mere fact that you do the matrix multiplexing just makes it self cleaning

all at once.

THE COURT: What was the significance of your statement that the noise prevention purpose of these devices would have been obvious to a person skilled in the art?

You mentioned that in connection with this discussion of these characteristics being inherent in the device.

THE WITNESS: In this recent discussion?

THE COURT: No. This was way back on your cross examination some weeks ago. Specifically, it was on Friday, January 27th, according to my notes.

THE WITNESS: I don't remember the exact context, but I was probably asked a question such that if an engineer skilled in the art at that time looked at matrix multiplexing of the lamps, would it be obvious to him that if he used it, he would also get the noise, the self cleaning, the noise immunity; and I would have answered yes to that question.

THE COURT: All right. Well, that's what I understood you to say, and what I'm wondering is this.

If it is obvious that matrix multiplexing results in noise prevention and noise immunity, doesn't that mean that it would be obvious to someone desirous of attaining noise prevention and noise immunity that he would use matrix multiplexing?

THE WITNESS: I don't think it would have been

obvious at that time. The more typical way to have thought to do this at that time would have been to use the scheme that was in the Atarian game where you would not gain these advantages.

However, let us assume that this person does recognize that the noise problem is severe and then does think of doing matrix multiplexing and then realizes that the self-cleaning of the lamps and digits there, he must also make the step to think that because he uses that matrix, he gets hardware noise prevention in the case of the lines, fewer lines, coming into the cabinet.

In the case of the switches, he has to recognize that when he writes the software that he can now add software on top of that hardware to double read them to do further noise immunity, et cetera.

In other words, for someone who wanted to read input from switches and light lights, it's my opinion that the use of matrix multiplexing, especially the way Frederiksen disclosed it, was not obvious at all, sir, in 1974.

THE COURT: Yet you say that if that same person who looked at a game containing matrix multiplexing in 1974, isn't it obvious to him that the reason matrix multiplexing is used was to prevent noise?

THE WITNESS: Oh, that is right. He would look at that without having been told that --

THE COURT: Suddenly a light bulb would go on.

THE WITNESS: That is right, and that is why the disclosure here says, ah, that is a good way to do it, sir.

THE COURT: All right. Thank you.

If there are any further questions along that line, feel free to ask them; otherwise we have gone through recross, and I am loathe to extend it any further. Otherwise it will go on forever.

Now, if you have got something that is absolutely essential that you think needs to be asked, go ahead and ask, but do not just assume that we are going to go round robin here for an indefinite series.

We have got to get on to the next witness, pleasant as it has been to have you with us.

THE WITNESS: I support your position, sir.

(Brief interruption)

REDIRECT EXAMINATION

BY MR. SCHNAYER:

Q Now, Dr. Schoeffler, the Court was asking you some

questions about one aspect of matrix multiplexing, and it was the self-cleaning aspect.

THE COURT: Well, I did not mean to limit my questions to self-cleaning.

There was a whole series of noise-prevention aspects of the invention which were gone into, and with respect to many of them, Dr. Schoeffler stated that their noise prevention tendencies would have been obvious to anybody, and I did not mean to limit my question to self-cleaning. I meant to address that whole array of noise immunity and noise prevention hardware.

BY MR. SCHNAYER:

Q Did you understand the Court's question?

A I believe so.

Q All right, just so it is clear.

Dr. Schoeffler, after one has this patent, the Nutting patent, and the program, and after one reads that, then is it your understanding that they could practice the invention?

A It is, sir.

Q They would then from that patent recognize this combination of hardware and software?

A It is my opinion they would so recognize it, sir.

Q Now, without that patent, before you had that patent program listing, and before you had that actual text of the

patent, would one have been able to figure out at that time, 1974, that combination of hardware and software? Would that have been obvious to a person at that time?

A It is my opinion that would not have been obvious, and that was my experience at that time. I do not believe that would have been obvious, sir.

Q Your testimony concerning what a person would have understood when he read the patent was directed at what he would have understood when he read the words of the patent and read the program, isn't that true?

A That is correct, sir.

MR. SCHNAYER: Your Honor, I have one more area. It was just a problem with some testimony, and I will have one or two questions.

Let me maybe ask one more question, also, on the subject the Court brought up.

BY MR. SCHNAYER:

Q Other than the noise prevention and noise immunity combination, were there other things of the software/hardware combination which are important in reading Claim 45 on a device?

A I am not sure I understand your question.

Would you repeat it, please?

Q I will ask it again.

Does real time response have any significance in the hardware and software combination in reading Claim 45?

A Yes, sir.

Among all the elements of Claim 45, we have required that when we talk about an operative implementation that it exists in the noise environment in a practical way or with an adequate real time response and with a practical level of

error recovery. Those things, too, are important in looking at infringement of Claim 45.

Q Is the hardware and software combination concerning that real time response interrelated to the hardware and software combination for noise immunity and noise prevention to get the operative matrix multiplexing?

A Yes, sir, it is, indeed, and that is why I emphasized the structure of the program as being so important. You have to do all of these things simultaneously. That is the characteristic of a real time system. Everything is going on in parallel.

So you have to worry about responding to this at the same time you are lighting this and making sure you do not have noise, and it is an interlocking -- an intertwined system. Everything has to work together.

Q How about error recovery? That is the other aspect you mentioned.

A Error recovery is part of the real time requirement. It has to be to a practical level of the game to be a satisfactory and operative game.

Q Is that the combination of hardware and software to get all of those elements, the real time response, the error recovery?

A All of those things are disclosed in the patent and are all part of that program I keep referring to as the structure of the program, and all of those things work together with the hardware and the software in combination to achieve all those ends.

Q That is a combination then of all these things?

A Absolutely, no one by itself is a good way to look at it because that kind of approach is doomed to failure.

It has to be looked at as a system. In fact, that was one of the comments in Dr. Vacroux's notes, if you recall, and it was what some people in '74 were not accustomed to doing, especially including the software aspects of it.

Q What advantages does that allow you in this matrix multiplexing? Does that operativeness, this combination, allow you the advantages of matrix multiplexing?

A It is the matrix multiplexing structure that allows you to organize a program and achieve these other things. That

is why you choose matrix multiplexing, sir.

Q One more subject matter, and then I will be done.

Just before lunch, during questioning by Mr. Lynch, he asked you a question about the summary chart, one of the items in the summary chart, PX469, which states: "No scanning during solenoid closure," and at that time he also had you come down and look at the Cleopatra and Disco Fever machines.

He asked you various questions about your conclusion that this is a noise-prevention technique.

Have you had an occasion to verify the accuracy of your conclusion in this regard as listed on the PX469?

A Yes, sir. Over lunch I went back to my notes and looked up two references, one in a deposition by Mr. Dussault concerning the Williams games, and one Mr. Edwall, concerning the Gottlieb games.

Q Could you please indicate which sections of that testimony you believe are relevant and explain why you believe it is relevant to this?

A Mr. Dussault in his deposition was discussing this business of scanning of switches and the inhibiting of them and indicates on the bottom of page 97 of his deposition, in answering a question about the scanning of the switches, whether they are always in effect going on cyclically and sequentially:

"The only exception to the overall scanning of the switches would be that the overall scanning of switches can be inhibited under software control and is in fact inhibited on a number of occasions in flash for a number of reasons.

"What are those reasons? As a way to debounce switches --" which is what I was trying to indicate over there -- "the scanning is inhibited or stopped. When drop targets are reset, we inhibit the scanning of switches. When the ball goes into the outhole, the scanning of switches is inhibited. When coin switches are registered, the scanning of switches is inhibited.

"There are a number of other occasions where inhibiting or scan kill can take place."

Mr. Edwall --

Q Mr. Dussault was talking about the --

A The Williams game.

Q -- Williams games.

A Mr. Edwall -- I have to find it again. I didn't mark it here.

Q This is Mr. Edwall, pages 840 and 841, is that correct?

A Yes, sir, the last paragraph is the context that I was referring to, where he is saying:

"So the same thing is true for all of these instructions. There are no strobe pulses being generated when you are performing those instructions.

"That makes it also true for solenoids, which goes back to what I said before, that when a solenoid is energized because of an instruction, that you cannot read any switch closures because there are no strobes being put out."

That was the one reference I was able to retrieve during lunch time, sir.

MR. SCHNAYER: I have no further questions, your Honor. Thank you.

MR. LYNCH: No questions, your Honor.

MR. GOLDENBERG: I have none.

THE COURT: All right, thank you, Dr. Schoeffler.

THE WITNESS: You are welcome, sir.

(Witness excused.)

MR. TONE: If the Court please, we ask leave to recall Mr. Frederiksen.

THE COURT: All right.

MR. TONE: Mr. Frederiksen, will you take the stand?

THE COURT: Your oath is still in effect, Mr. Frederiksen.

You may be seated.

THE WITNESS: Thank you, your Honor.

JEFFREY E. FREDERIKSEN, PLAINTIFF'S WITNESS, PREVIOUSLY SWORN.

DIRECT EXAMINATION

BY MR. TONE:

Q Your name is Jeffrey Frederiksen?

A Yes.

Q You testified in this case earlier in the trial?

A Yes.

Q Mr. Frederiksen, do you recall testifying at that time that the electronic Flicker machine in the courtroom, plaintiff's Exhibit 333, was in the same condition in substance then, when you were testifying, as it was on September 26, 1974, when it was demonstrated to people from Bally?

A Yes.

Q Have you since learned or received any information

with respect to that statement?

A Yes, I have.

Q Did you possess that information at the time you testified?

A No, I did not.

Q Will you tell us what that information is?

A I was told that some of the parts in the machine had dates later than the September 26 date of 1974.

Q Were you aware that that was so -- this may be redundant, but I want to make sure it is covered -- were you aware that that was so when you testified previously?

A No, I was not.

Q Have you been informed particularly with respect to the four E-PROMs in the machine?

A Yes.

Q What information do you have with respect to that?

A There was a date on one of the E-PROMs that was apparently a month later than the September 26 date.

Q you are referring to a pencilled notation?

A Yes.

Q Do you know whose hand that pencilled notation is in?

A yes, it appears to be my hand.

Q Did you determine that from exmining a photograph of that notation or a photograph of the board which included that chip?

A Yes.

Q Was the photograph one we have been talking about, Plaintiff's Exhibit 471?

A Yes.

Q Do you recall placing the date on that chip?

A No, I do not.

Q Have you also been informed that two of the other four E-PROMs have code numbers placed thereon by the manufacturer which indicate the dates?

A I was made aware of that.

Q Are you yourself familiar with the meaning of coded dates on the particular E-PROMs?

A No, I was not aware of the coding dates on E-PROMs.

Q You have since been informed by counsel what they learned through an investigation on that subject?

A Yes.

Q If you assume with me that we have learned that two of the other E-PROMs bear codes which indicate that they were produced subsequent to September 26th, 1974, and, particularly, in the month of October or possibly early November of '74, then we have three of the four E-PROMs that bear dates subsequent to September 26, 1974.

I call your attention to your testimony earlier in the case that the programming of the E-PROMs was completed prior to the demonstration on September 26, 1974.

What is your testimony on that subject at this time, having this additional information?

A That is still the best of my recollection.

Q And can you state on what you based that recollection?

A The machine was operational at the time of the demonstration. We had many revisions on those PROMs.

I had testified earlier, also, that I had worked on the simulator, and then I left the simulator and eventually made a set of PROMs and plugged them into the actual Flicker itself; and then the Flicker was standing alone.

Any further debugging then I went back to the simulator to create and then installed new versions of those E-PROMs.

Now, those E-PROMs that I was using should have been earlier dated and should have been used many times; and the PROMs that apparently are in the machine now are very

recent vintage and may have only been used just once. I mean, just like, for example, service copy or something like that and, obviously, were not the ones that I was using in the process of developing the code; but at the time of the demonstration, those PROMs that I was using, erasing and re-using -- because they are re-usable -- were put in the machine, and the machine was operational on that date.

Q. You testified that you did certain noise testing prior to that date, that date being the date of the demonstration.

Does the addition -- does the learning of the additional information we've spoken of cause you to change that recollection in any way?

A. No, it does not.

Q. Where has the machine -- and I'm referring always to Plaintiff's Exhibit 333, the electronic Flicker -- where has that been since 1974, in summary?

A. Well, we've had the machine in our possession at Dave Nutting Associates.

First, I was in Milwaukee, and then we moved down to Chicago, and we brought the machine with us.

The machine was in service in Chicago until one of the attorneys suggested to us that we should shut it down since it was an important piece of evidence, and we shouldn't continue playing it.

Q Approximately when was that?

A That was after -- a couple of years after we were in -- or about a year or so after we were in Chicago. I don't recall.

Q When you speak of being in Chicago, do you mean being in Arlington Heights?

A Yes, sir.

Q You mean in the Chicago area?

A Yes.

Q And can you give us an approximation on the year when that occurred?

A Around '78.

Q You said the machine was played from time to time. By whom?

A The employees at D and A played the machine quite a bit when it was in the Arlington Heights area, and we also played it quite a bit while it was in Milwaukee.

Q Were you aware, Mr. Frederiksen, of the existence of four boxes of electronic components that have been brought to the attention of counsel for both sides during the recess in the trial?

A Yes.

Q And you have been aware of those boxes for some years?

A Yes. I have been aware of their existence since -- I made them back in 1974.

Q That is, you made the boxes in what sense?

A Actually, they were Intel boxes that we had received some parts in. I used the parts out of them and then used them as convenient storage compartments for static-sensitive parts because they contained a special kind of conductive foam material in the bottom. They were very nice storage units.

Q Were you aware prior to the recent past, the last -- let us say the last week or two, of whether the boxes contained E-PROMs?

A No. I had no recollection of them containing E-PROMs.

Q When did you learn or recall that they had -- they contained E-PROMs?

A At my recent deposition.

Q Was that on Monday of this week?

A Yes.

Q And you learned it how? By looking in the boxes at that time?

A Yes.

Q And you gave some testimony at that time about your recollection or lack thereof or whatever with respect to that?

A Yes.

Q Was there a reason for having extra E-PROMs at Dave Nutting Associates, Intel E-PROMs?

A Yes.

Q And what was the reason or reasons, if there were more than one?

A Those E-PROMs were used as most E-PROMs typically are; although, today we use them in production quite a bit, as well. In those days we used them for development, and so we'd erase one set and be programming a second set to put back into the machine; and we could circulate around sets of these E-PROMs. They take a while to erase after you use them.

I noticed in the box the E-PROMs were substantially older. They were probably more the types of E-PROMs that would have been used on a continuing basis for some of the earlier developments; but, also, if you use them many times, they do tend to get weak. That might give you good reason to want to make a fresh copy to make sure that the program would stay permanent.

Q I'd like to turn now, Mr. Frederiksen, to the program listings that were in evidence prior to the recess. There were two of them. Plaintiff's Exhibit 30 and Plaintiff's Exhibit 436. Do you recall that?

A Yes.

Q. 436 was not the one that was submitted to the Patent Office with the patent application.

Are you aware at this time of any differences between the instructions on Exhibits 436 and 30, the listings in evidence, and the instructions that are on the Flicker E-PROMs now?

A. Yes.

Q. How did you become aware of those differences?

A. Jerry Schnayer had contacted me and asked me to take a look at the E-PROM dumps that were made by the opposing counsel and asked if I could check to see if they did really, indeed, compare against the listing.

Q. Did that occur on about January 19 while the trial was going on?

A. Yes.

Q. Then what happened?

A. We received a copy of the dumps, four sheets of paper, one with each of the E-PROMs, and they were just machine numbers.

We started disassembling the listing and comparing the numbers against --

Q. Just so the Court can understand, and maybe I do not need to do this, your Honor --

If your Honor understands what machine numbers are, I will not bother, but there was a time when I did not, a

recent time, and I will take a minute to do that.

THE COURT: Well, go ahead because I may think I understand it, and I could be wrong.

MR. TONE: Very good.

BY MR. TONE:

Q. I hand the witness, and also I hand up to your Honor a copy of Plaintiff's Exhibit 473, and I ask what that is.

A. This appears to be a copy of the four E-PROMs that are in the Flicker.

Q. Is that a copy of what you got on about January 19th?

A. I have no way of telling exactly, but it does look like it.

Q. Does it appear to be that document?

A. Yes, it does appear to be.

Q. Now, as a person skilled in the computer art, can you look at that document and read a program just by looking at it without doing anything more?

A. No, not really. It would be very difficult.

Q. What do you have to do in order to reduce it to something you can read?

A. Well, you can do one of two things.

If you are looking for similarities, you could either take an existing English listing and convert it to numbers and just compare the numbers. But we got a little ways into that and found that there were numbers that were

different.

Q That we being who?

A. Dave Otto and myself.

Q That was after you received the machine code listing that you have just testified about?

A. That is correct.

Q All right. So you got into that, and go ahead.

A. Then I realized that it was going to be a little more difficult a task. So I had asked Mr. Otto to enter the numbers into the computer rather than do a manual comparison.

Simultaneously while he was entering the numbers, I started writing a disassembler.

A disassembler is a special program that takes these numbers and converts them now to the actual English again. It reverse assembles. We call it a disassembler.

I did create that disassembler, and after I did the disassembly, then I went back and inserted the names that were actually in the original program to where they would correspond in the disassembled program that I had, and now that I had an English copy to compare against another English copy, the differences were more easily noted.

Q Did you prepare some kind of a comparison of the disassembled listing to the listing that had been submitted to the Patent Office, Plaintiff's Exhibit 416 or 436?

A Yes, I did.

Q I hand you Plaintiff's Exhibit 466.

Your Honor, I believe, has that already.

I ask you what that is.

A This is a copy of the disassembly that I made that demonstrates the -- with asterisks the differences that I had noted at that time.

Q Did you then make an analysis of those differences to determine their purpose and to determine their nature?

A Yes, but not at this time. It took quite a while to do that, and I did that in the following month.

Q Over that month, how did you go about making that determination?

A I had to actually re-interpret the code, go through it as if I did not know the code at all, and then try to understand the code and document the code.

Then I subsequently annotated the duplicate of this listing with those annotations.

Q I hand you Plaintiff's Exhibit 472 and also hand a copy up to your Honor.

First of all, I note there is a date near the top of the document if you fold the first page back, February 28,

is that correct?

A Yes.

Q Tell us what that is in relation to what you have just described, the process you have just described.

A This is the date of the last changes that I had made to the annotations.

I had them up over this period of time making several copies of this and adding annotations as I went along.

This is the most complete annotated list that I have.

Q At the time when you had completed preparing the exhibit you have in front of you, did you reach a conclusion as to the nature of the differences between the program dumped out of the E-PROMs on the Flicker machine and the programs submitted to the Patent Office?

A Yes, I did.

Q What was that conclusion?

A The differences were primarily of a de-bugging nature, to make the program operative due to peculiarities of machine language.

Q Were there errors in the program?

A Yes, there were.

Q That is, in the program submitted to the Patent Office?

A Yes, there were.

Q Does the E-PROM dump show correction of those errors?

A Yes, it does.

Q Can you give us an example, a simple example, of one of the errors?

A Right on the first page at Instruction 27, and it would be interesting to take a look at the original program from the Patent Office to compare it. There are two --

Q I can give you that. Hold on.

That is Exhibit 436, your Honor.

A In instructions 27 and 29, on the original program it says:

"Jump on condition 10."

Now, 10 means no carry. "Jump on condition."

Actually, in the disassembly, I did not want to remember those numbers. In those days we had no alternative. We had to remember them. So I actually added the disassembler to tell us what they meant.

It means jump on condition, no carry, to routine interrupt plus 5 -- that is the address of interrupt, and five more instructions.

3

Now, in the program interrupt plus five is -- interrupt is at 256, and plus five would be around 261, except that instruction cannot go beyond instruction 255.

A peculiarity of this processor is that it is page bound. Each page is 256 instructions long. The first page is from zero to 255. It can jump anywhere in that page, but it cannot jump outside of that page.

Now, it is very clear the intention of this program is to get to interrupt plus five, which is outside of this page.

Now, the modification that you can see in the disassembled listing, it says, "Jump on condition carry," now, instead of, "Jump on condition not carry to main."

Now, the main program is at instruction 10, obviously, within the first 256 instructions, very close.

Then it uses the more flexible instruction, jump unconditional, to 261. Now it can make it there because jump unconditional can go anywhere within the 4000 instruction range. That is a long-range jump instruction.

So the intention is very clear in the original listing. It is purely a debugging maneuver to swap those two instructions like that.

Q Were you aware of the differences between the Patent Office, the copy you sent to the Patent Office, the listing you sent to the Patent Office, and the program that was in

the E-PROM Flickers -- E-PROMs of the Flicker machine at the time you turned the listing over to your patent attorney to submit to the Patent Office?

A Not that I recall.

Q The application was filed on May 13th, 1974, and you turned that listing over to him sometime prior to that, I take it?

A Yes.

Q Do you recall when approximately?

A I gave him a copy of the listing, the teletype listing, the one that is 436, somewhere around February or March time frame of '75, I think. That is the best of my recollection at this time.

Q All right.

With reference to the date of the demonstration, the Bally people, on September 26, 1974, do you know when you made the changes that appear on the actual E-PROMs in the machine and that do not appear on the program listing 436?

A To the best of my recollection, all changes were in place prior to the demonstration.

18-1b1

Q If the program listing shown or that was submitted to the Patent Office had actually been the precise program on the E-PROM chips of the machine, would the machine have worked on September 26?

A No, it would not.

Q Can you tell us why in a few words?

A The first example that I showed relative to the obvious debugging error is also what I would refer to as a fatal error. The program would not execute.

Errors of that nature would have had to be corrected for the game to operate at all.

Q If you had made a strict assembly of the program submitted to the Patent Office, then that assemply in the E-PROM chips would not have worked, is that correct?

A That is correct.

Q When you made those changes, Mr. Frederiksen -- let me ask another question. I will withdraw that.

Do you have an actual recollection of making those changes; that is, do you remember sitting down and making the changes?

A I have recollection of making changes to programs. I recollect giving this program to the patent attorney, and I recollect making changes.

What I don't recollect is that this particular listing that I handed didn't include all those

changes. That I didn't recollect.

Q You say you didn't recollect. Are you saying that you didn't recollect that until you received the information from the E-PROM dump?

A That is correct.

Q How did you go about making the changes when you made them in the course of debugging the program?

A The changes were relatively easy to make, although there appears to be a few of them here. The way that --

Q Well, actually have you counted them?

A No, I haven't.

Q Well, we won't go into that. Professor Schoeffler did, and he gave us his testimony about that and we won't take time to go into it again, but go ahead and tell us how you went about it.

A I would take the E-PROMs out of the actual Flicker game, take the code back into the Intellec, modify the instructions that I wanted to change, and then I would annotate those changes on a copy of the program similar to 436.

Q Do you have that copy of the program on which you made the annotations?

A No, I do not.

Q Do you know where it is?

A No, I do not.

Q Did you print out the contents of the E-PROMs after

the patches and corrections and debugging had been done?

A Not that I recall.

Q One of the E-PROMs bears the notation October 22, and you recognize it as your handwriting in looking at the photograph.

Do you know the significance of that date?

A No, I do not.

Q Do you have any recollection of why you placed that date on the E-PROM?

A No, I do not.

Q I apparently did give the wrong date. The date on the E-PROM chip is October 25. I may have said October 22, your Honor, and Ms. Sigel corrected that.

That change, I take it, would not change your answer, Mr. Frederiksen?

A No, it wouldn't.

Q. We noted when you testified previously that the program listing in evidence and that was before you at that time has an October 22, 1974 date on it. Do you recall that?

A. Yes.

Q. Do you know why that is? Do you know the significance of that?

A. No, I do not.

Q. Are you aware of any differences between Plaintiff's Exhibit 436, which is the one submitted to the Patent Office, and a somewhat clearer version of the program, Plaintiff's Exhibit 30, both of which have been in evidence since your previous testimony, which I think were placed in evidence during your previous testimony?

A. Yes.

Q. Tell us about that.

A. The clearer copy was done when I had a better printing device than a teletype machine. The teletype machine only printed on this yellow paper that didn't have page boundaries and whatnot, and it was very difficult to get a good clean copy with page boundaries.

In order to do that, though, by that time I had a 4040 system. I had upgraded it to a 4040. I no longer had the 4004.

They had a different assembler. There were some instructions that had to be changed because they were

reserved words. Those reserved words included "end." That now meant the end of the program that was now required by the assembler, and one of my routines was named "end" and that kept stopping the assembly process. So I had to change that, and I think I changed it to some other name.

Another one was "add." I had a name called "add" but that was also an instruction. The new assembler required that I couldn't name a routine by an instruction, so I had to change that name, too, and I changed it to "at dd" as a mnemonic for "add."

I don't recall any other changes at this time, but they were basically just done to allow the 4040 to assemble the instruction so I could get a good, clean printed copy for the patent attorney.

Q. We also called to your attention recently a box of paper tapes dating from 1974. Did you come over and examine those this morning?

A. Yes, I did.

Q. In the courtroom?

A. Yes.

Q. Were you aware that those existed until a few days ago or a short time ago?

A. No, I was not aware of that.

Q. Did you become aware after Mr. Otto had given his deposition last Monday?

A. yes.

Q Did you find -- in looking over those tapes, did you find anything in the box that appeared to you to relate to the Flicker machine?

A There's one Flicker tape in there that seems to be related to this clearer copy that I had made subsequent printing, but nothing from the original Flicker that I saw there.

Q And you arrived at that conclusion merely by visually examining the tapes without attempting to read them or whatever; is that right?

A Yes.

Q You made a brief visual examination in the courtroom in the presence of one of the representatives of the attorneys from both sides is that right?

A That's correct, but there was some information printed on the tape that led me to believe that.

Q All right.

Turning now to the -- one more question.

Do you have an opinion, Mr. Frederiksen, as to whether a person of ordinary skill in the computer programming art could have read the patent -- the program listing submitted to the Patent Office and together with the printed patent have practiced the teaching of the patent?

A yes, I do have an opinion.

Q And what is the opinion?

A It should have been relatively easy for anyone aware of this programming language to be able to track and understand what the intentions were.

Q Turning now to the matter of the schematics, which also were the subject of some of your testimony on the previous occasion when you testified.

Plaintiff's Exhibit 28, you may recall, you testified about and said that it depicted Flicker as of September 26, 1974.

Do you recall testifying to that effect? And I reminded you of that testimony last night before we -- in a discussion with you. So, I won't show you Plaintiff's Exhibit 28 unless you need to see it again.

A Yes.

Q Do you recall that?

A Yes, I do.

Q Are you now aware of inaccuracies in Plaintiff's Exhibit 28?

A Yes, I am.

Q I think answering the next question may be easier if you actually have the exhibit in front of you. What are the differences between -- if there are some -- between plaintiff's Exhibit 28 and Flicker?

And as you identify them, you can perhaps explain why those differences exist.

A In the -- would it help if I got up and pointed to that one so --

Q I think it would.

A In this particular part next to the output called lamp drive on the right side of the schematic is a part labeled 14543, and that is clearly a drafting error since it has the identical pinout as the part right adjacent to it, which is a 14042.

Q By the way, Plaintiff's Exhibit 28 was prepared when in relation to the time the Flicker machine was put together?

A This was before the assembly of the actual Bally Brain.

Q So, the machine was built from the schematic? Is that what you're saying?

A Yes, it was.

Q All right. Go ahead.

A That was pretty obviously a drafting error, since the pinout totally and accurately depicts exactly what the part is that is supposed to go in there.

Below there there's also two switch inputs shown. They're both called 14502.

I was not sure that the second bank of switches was or was not implemented in the actual Bally Brain. I did know, though, that we did not require all those switch inputs on this particular game.

Q Would they have been required ever on any game of this

design?

A Well, they may have been if you needed more switches. It would double the number of switches that you could have on a game, and I had demonstrated here exactly how that would be accomplished within this simple architecture.

Also, it's not -- another common practice is if the technician is wiring up a machine and he sees, for example, there's a particular part, a 14050. This is a non-inverting buffer.

Now, if you invert a signal twice, it's the same as a non-inverting buffer. So, what he had done is used a pair of 14049 inverters tied in a series to make the equivalent of a 14050, and he had used a pair of those here, apparently, in the actual assembly. I do not recall that.

Another one that I did recall after my memory was refreshed when this discovery was -- that this also, the other 14050 that was used on the test input wire, was replaced with a single inverter. Now the signal coming out of here would be upside down, but that was no big problem since there's a complementary instruction I could have used to test that wire within the program, and so the equivalent of a second inverter was available just by its opposite instruction, and that effectively was the same as having two inverters to replace that part.

And so, there was no significant change, and

I still have no direct knowledge as to whether or not this part here does or does not exist on the actual Bally Brain itself.

Q Calling your attention to the 15-- 14502 on the upper set of switches, do you have anything to say about that?

A About which part again?

Q Well, let's see. Is there shown or is there on the machine -- maybe let me put it this way.

It appears that instead of a 14502 on the upper set of switches, there is a 14016 chip.

A Oh, yes.

Q Can you tell us -- explain that?

A A 14502 is a tri-stateable inverting buffer. So, what it means is that it not only lets -- it inverts the signals of the switches coming on to the bus, but its most important reason for being there is that it can turn the switches off so the bus can be used for other purposes. It's like a floodgate. You can either open it or close it and let the information flood onto this particular bus.

There was another device that I could use that was non-inverting, and that was a 14016. It served the same purpose. You could open up the gate and let the information onto the bus, but it did not invert the signals, and that saved -- made the instructions a little simpler, and I found that more convenient to use.

But again, by just simply complementing the accumulator, you could have used the 14502 equally as adeptly. So, it really was again a relatively inconsequential change.

Q You've said that Plaintiff's Exhibit 28 was drawn before Flicker was built.

When were the changes made that you have described?

A All these changes were made before the Flicker was actually programmed.

Q In the process of building it; is that right?

A Yes.

Q Referring now to the Flicker machine and Plaintiff's

Exhibit 53, the mux chart, are there differences between the machine and the mux chart?

A The only one I suspect is not in there is the test switch itself in the upper left-hand corner on the mux chart.

Q What about the operator-adjustable switch in the left-hand side?

A The operator had -- we had proposed that the operator be able to set at which point you got an extra feature, such as a free ball or a free game; and that entire matrix of operator settings was implemented in hardware, but we never did implement that in software for that prototype.

Q Why not?

A Well, it wasn't necessary for the demonstration, and it was just a short-cut on time.

Q If a production model had been made, would that have been implemented in software?

A Yes, it would have been.

Q Refer again now, if you will, Mr. Frederiksen, to Plaintiff's Exhibit 471, which is the photo of the Flicker circuit board, and look at the third row.

Are the four parts with the jumper wires in that row shown in any Flicker schematic?

A I don't recall. I don't believe so.

Q Do you have any recollection of how the jumper wires

came to be in the condition they are now, or in the position they are now?

A I recall putting the jumper wires in there, but I have no recollection as to why.

Q What did they replace, if anything, and what function do they perform?

A I could guess, but I'd have no specific recollection.

Q All right. But you recall putting them in, but you don't recall when you put them in; is that right?

A Well, I recall when I put them in. I recall all the hardware changes to this machine were done before the demonstration.

Q All right. Mr. Frederiksen, is Plaintiff's Exhibit 333, which is the Flicker -- electronic Flicker machine in the courtroom, in any material respect different from the machine that was demonstrated to you -- by you to the Bally people on September 26, 1974, based upon the information you have received since you last testified here?

A I'm not sure quite what you mean by material difference.

MR. TONE: Maybe it would help if the court reporter read the question.

(The pending question was read by the reporter.)

BY THE WITNESS:

A I'll clarify that as I go.

I'm not aware of any wiring changes that are any

different. I don't recall going in and doing any board changes. I don't recall modifying it for any new or different parts after the demonstration. Although there may be newer parts that might have been put in there, they're still the same part. The replacement might be of a nature like replacing a light bulb, but I have no recollection of any substantial change in that machine since the date of the demonstration.

MR. TONE: May I confer for a moment, your Honor?

THE COURT: Yes.

(Brief interruption)

MR. TONE: If the Court please, we offer in evidence Plaintiff's Exhibits 471, 472 and 473.

THE COURT: All right. They're received.

MR. GOLDENBERG: No objection, your Honor.

(Plaintiff's Exhibits 471, 472, and 473 were received in evidence.)

MR. TONE: May we confer one more minute, your Honor?

THE COURT: Sure.

(Brief interruption)

MR. TONE: Excuse me, gentlemen. The witness when handed the PROM -- may I address my opponents, your Honor?

THE COURT: Sure.

MR. TONE: When handed what we understand is the PROM dump made by Mr. Vacroux, the witness said it looked like what he got, but he couldn't tell without examining it closely.

May I ask that you look at it and see whether you can say?

I represent that it is, and --

MR.LYNCH: I have never seen it.

MR. TONE: Is that sufficient --

MR. GOLDENBERG: I believe it is.

THE COURT: All right.

MR. GOLDENBERG: I don't --

MR. TONE: All right, it appears to have been signed by Mr. Vacroux.

MR. GOLDENBERG: Dr. Vacroux is here --

MR. TONE: Dr. Vacroux, excuse me.

MR. GOLDENBERG: -- if the Court or you would feel more comfortable showing it to him and having his response, but I don't think that is necesary.

MR. TONE: All right, I just want to make sure it is authenticated. We have offered it and it has been received, and I wanted to be sure we had the right foundation

for it.

No further questions on direct, your Honor.

CROSS EXAMINATION

BY MR. LYNCH:

Q Mr. Frederiksen, you gave some testimony about those late dated E-PROMs and how they might have gotten into the machine just a moment ago.

A Yes.

Q Do you have any recollection of how they got in the machine?

A No.

Q When I asked you earlier this week, you indicated --

I asked you, "Have you discussed with anyone the possibility that you might offer testimony in explanation of the existence of those potentially late-dated chips in the Flicker machine?"

You answered: "We have talked about the dates on those parts, but I had no recollection and I had no additional testimony to offer."

Now, is that in conformance with your testimony at this time?

A That is correct.

Q You have no testimony to offer, and what you testified about your work with machines and replacing parts, it was pure speculation, isn't that correct?

A No, I made that testimony earlier. We talked about the fact that I replaced the E-PROMs in the process of developing the Flicker program to the date of September 26.

I just reiterated that today.

Q I understand that. What I asked you Monday is how did the late-dated chips get in there?

A I have no recollection of that.

Q And you still don't?

A I still don't.

Q There were, of course, late-dated chips that got in in association with the program, correct?

The E-PROMs were late-dated?

A Yes.

Q One E-PROM bore in your hand the date of 10/25/74, correct?

A That is correct.

Q Furthermore, two of the 14049 chips were late-dated and bore a date code of the 44th week of '74?

A That is correct.

Q Those also --

A Excuse me. I believe that to be correct. I did not verify that myself.

Q I can let you verify it.

A No, I have no reason to disbelieve you. I just did

not personally look at them.

Q So those changes also were made in and around the same time?

A I don't know. I have no recollection.

Q You testified about noise and that you recall having made the noise test, correct?

Noise has seemed to loom a lot larger than I expected during five years in the Patent Office, Mr. Frederiksen, so I want to ask you some questions about the noise tests you performed.

etn. opped re- sign- off. LP

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You testified that you went from the IQ computer more or less directly into the pinball machine, correct?

A. Yes.

Q. It was --

MR. TONE: Excuse me, your Honor. I do not want to interrupt Mr. Lynch's examination, but I do not want my silence to be construed as acquiescence in his commentary on what happened in the Patent Office.

THE COURT: Or agreement that this is within the scope of the direct examination.

MR. TONE: That is correct also, your Honor.

MR. LYNCH: I will forego it, your Honor.

THE COURT: Well, I --

MR. LYNCH: Let me just --

THE COURT: Let me say this, obviously, I want to get everything that the witness knows, but if it is something that --

What is this? Is this something new?

MR. LYNCH: Your Honor, when Mr. Frederiksen came on the stand initially, I had no idea that the noise aspects of this invention as developed by Dr. Schoeffler would loom as large as they do. Whether by naivete or what all, I did not.

Now, we are talking about a reduction to practice that occurred in September, 1974.

THE COURT: Well, what you are really doing is moving

to recall Mr. Frederiksen for further cross examination. If there is no objection to that, I will allow it.

MR. TONE: Within limits.

I do remind the Court that Mr. Frederiksen testified at some length about the noise problems that he dealt with.

THE COURT: I sure remember that.

MR. LYNCH: Well, there was a question about noise in Mr. Tone's examination just a moment. There was a question about noise.

MR. TONE: And it related solely to the timing and the witness' recollection as to the timing of events.

THE COURT: Well, go ahead, but let's keep it reasonably brief. We are going to quit here no later than 6:00 o'clock, and it is 5:30 now.

MR. TONE: Your Honor, I yield to you, but I had inquired last night --

THE COURT: I did say 5:30.

Well, let me ask you again. The schedule next week is we are going to go Monday --

MR. TONE: And Tuesday.

THE COURT: -- and Tuesday.

MR. TONE: I had expected to be farther along than we are at the end of today, I have to admit, but I still think we can finish Tuesday.

THE COURT: Tuesday, all right.

44

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Well, shall we ask Mr. Frederiksen to come back then on Monday morning or any time next week?

MR. TONE: I would think we can have him here Monday morning, and I think it would be more orderly to finish with him before we go on to the next witness.

THE COURT: All right, let's do that.

So we will recess now until Monday morning at 9:30.

MR. TONE: Very well.

THE COURT: Have a good weekend.

MR. TONE: Thank you, your Honor.

MR. LYNCH: Thank you, your Honor.

(Proceedings in this case were adjourned until Monday, March 19, 1984, at the hour of 9:30 a.m.)

end